

Appendices to:

The Upper Sacramento River Anadromous Fish Habitat Restoration Project:
Monitoring of Habitat Restoration Sites in the Upper Sacramento River in 2020-2021

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Upper – 3,250 CFS	80
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Lower – 3,250 CFS	82
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WYNDHAM (IMPACT)	83
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APPENDIX A: SITE DESCRIPTIONS

Site	Control / Impact Site	Pre-Restoration Characteristics
Painters	Impact	Historically a side channel connected to the mainstem river at all baseflows. Pre-restoration gravel buildup at entrance cut off side channel even at high summer base flows leaving isolated shallow pools with some interstitial water flow through the gravel bar.
North Cypress	Impact	Site consist of two restored channels, an upstream (upper) section and a lower section. Pre-resoration, the upper section was a large alcove / backwater connected to the mainstem at its downstream end at all baseflows. This backwater extended upstream to approximately where the two constructed channels confluence into the large pool. Upper constructed split channel area consisted of several watered depressions disconnected from the mainstem at all baseflows. The lower restored side channel section was one large pond feature disconnected from the mainstem at all baseflows.
South Cypress	Impact	Pre-restoration site consisted of a series of isolated ponds and pools, the largest of which was connected to the mainstem river at higher summer baseflows via a culvert.
Wyndham	Control	Functional natural side channel, connected to mainstem Sacramento River at all baseflows.
Shea Island	Impact	Functional natural side channel, disconnects from mainstem Sacramento River at approximately 6,000 cfs (KWK).
Clear Creek	Control	Functional natural side channel, connected to mainstem river at all baseflows. Note that in recent years this side channel has been impacted by wildfire related fine sediment deposition coming out of Clear Creek. Additionally, the amount of water flowing into the channel has decreased over time due to coarse sediment buildup at the inlet. Current winter base flows entering the side channel are likely only a few cfs.
Bourbon	Control	Functional natural side channel, connected to the mainstem river at all baseflows
Kapusta 1A	Impact	Prerestoration, the lower portion of side channel was a backwater connected to the mainstem river only at high summer base flow. The upper portion of the side channel was an isolated pond disconnected at all baseflows.
Kapusta 1B	Impact	High flow channel disconnected at all baseflows. Depressions in pre-restoration channel do not hold water as channel is higher than the mainstems elevation. Inlet and outlet at Sacramento River are braided and not well defined.
Kapusta Island	Impact	Functional natural side channel that splits off of the upper portion of the Bourbon island side channel. Historically, disconnected from the Bourbon Island side channel at approximately 5,000 cfs (KWK). In recent years it has remained connected to Bourbon Island side channel at the lowest winter baseflows with less than 2 cfs of inflow.
Anderson R. Park Ph. 1	Impact	Well defined high flow channel disconnected from the mainstem river at all baseflows. Temporary highflow inundations leave a series of isolated pools that trap salmonids in winter months. Lower portion of pre-project channel was pond like and held water year round.

Anderson R. Park Ph. 2	Impact	Well defined high flow channel disconnected from the mainstem river at all baseflows. Pre-project channel held several pond like features including beaver constructed ponds that held water year round.
Anderson R. Park Ph. 3	Impact	Historic high flow channel disconnected at all baseflows and not well defined along its entire length. Upper portion of the channel was much higher elevation than the mainstem without any pool/pond features that hold water at winter / summer baseflows. Downstream portion empties into a well defined backwater pool that is connected to both another split channel and the mainstem river.
Reading Island Upper	Impact	Historic side channel disconnected from the mainstem river at all flows due to levy / road construction.
Reading Island Middle	Impact	Pre-restoration, the middle reach of the Reading Island site was basically Anderson Creek. The upstream end of the middle reach begins at the confluence of Anderson Creek and the newly constructed side channel. Anderson Creek has low winter baseflows, and greater summer baseflows due to agricultural/irrigation related return flows to the channel.
Reading Island Lower	Impact	Pre-restoration, the lower reach of the Reading Island site was basically Anderson Creek. The upstream end of the lower reach begins at the norther end of the BLM parcel, and extends downstream past the historic boat ramp. Anderson Creek has low winter baseflows, and greater summer baseflows due to agricultural/irrigation related return flows to the channel.
Lake California	Impact	Functional natural side channel, disconnects from mainstem Sacramento River at approximately 6,000 cfs (KWK).
Mainstem North	Control	Site is not a side channel, but rather the margin of the Sacramento River innundated at all baseflows.
Rio Vista Upper	Impact	Functional natural side channel, disconnects from mainstem Sacramento River at approximately 6,000 cfs (KWK).
Rio Vista Lower		High flow channel disconnected at all baseflows. Small depressions in pre-restoration channel ponded water at higher baseflows. Confluence with Sacramento River consisted of a backwater pool.
East Sand Slough	Impact	High flow higher elevation channel disconnected at all baseflows. Deeper isolated pool depressions trap salmonids when high flows recede, and can remain ponded into summer. Downstream confluence with Sacramento River has no backwater pool features.
Mainstem South	Control	Site is not a side channel, but rather the margin of the Sacramento River innundated at all baseflows.

APPENDIX B: CENTRAL VALLEY LENGTH-TO-DATE CHART

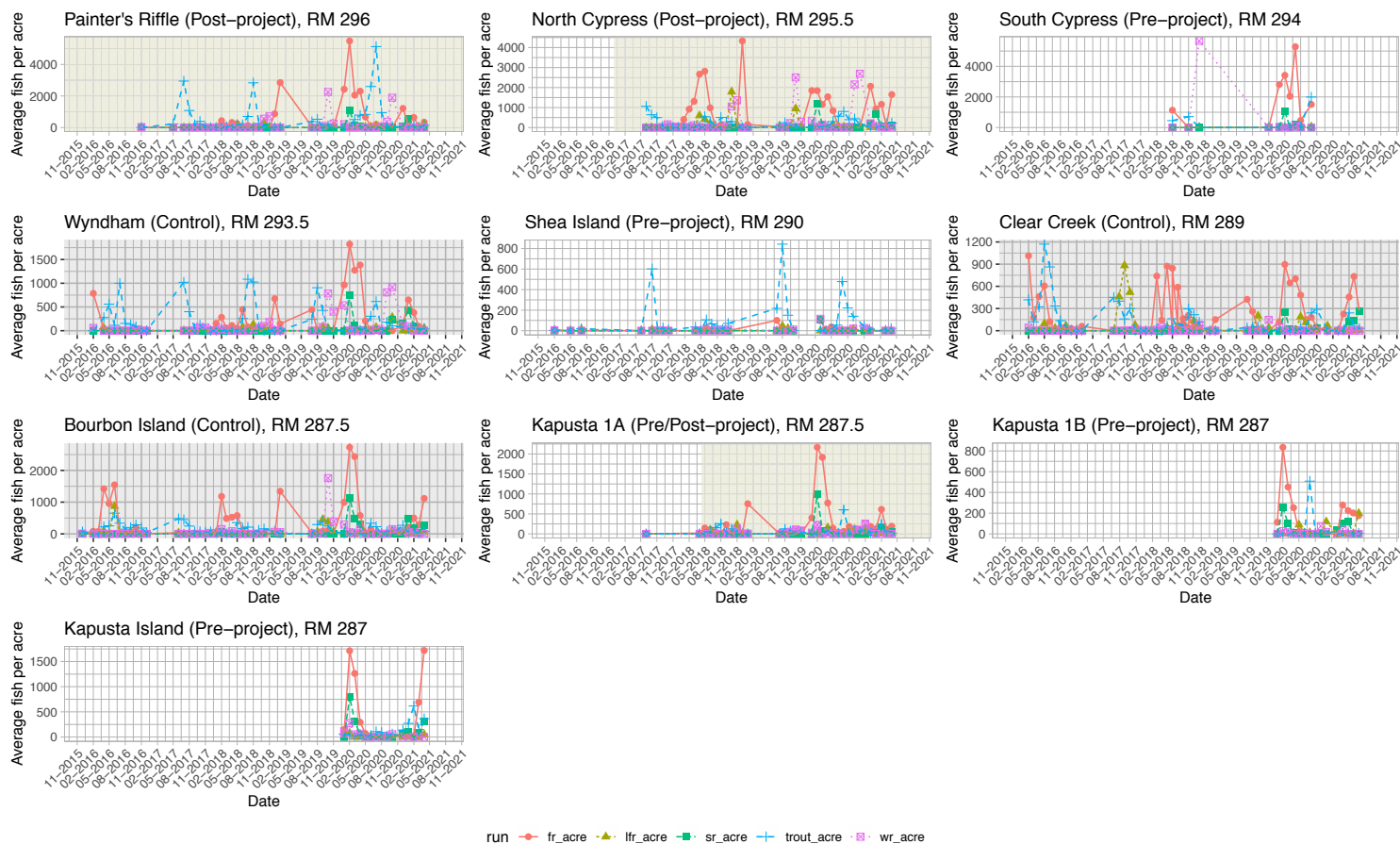
One page example with a subset of dates

RANGES OF FORK LENGTHS FOR THE VARIOUS CHINOOK RUNS BY DATE

DATE	FALL	SPRING	WINTER	LATE-FALL	All runs SEE BELOW	DATE
1-Jan	0-41	42-55	56-111	112-202	203-270	1-Jan
2-Jan	0-41	42-55	56-112	113-230	231-270	2-Jan
3-Jan	0-41	42-56	57-112	113-205	206-270	3-Jan
4-Jan	0-41	42-56	57-113	114-206	207-270	4-Jan
5-Jan	0-42	43-56	57-114	115-207	208-270	5-Jan
6-Jan	0-42	43-57	58-115	116-209	210-270	6-Jan
7-Jan	0-42	43-57	58-115	116-210	211-270	7-Jan
8-Jan	0-43	44-58	59-116	117-211	212-270	8-Jan
9-Jan	0-43	44-58	59-117	118-213	214-270	9-Jan
10-Jan	0-43	44-58	59-118	119-214	215-270	10-Jan
11-Jan	0-43	44-59	60-119	120-216	217-270	11-Jan
12-Jan	0-44	45-59	60-119	120-217	218-270	12-Jan
13-Jan	0-44	45-59	60-120	121-218	219-270	13-Jan
14-Jan	0-44	45-60	61-121	122-220	221-270	14-Jan
15-Jan	0-45	46-60	61-122	123-221	222-270	15-Jan
16-Jan	0-45	46-61	62-123	124-223	224-270	16-Jan
17-Jan	0-45	46-61	62-123	124-224	225-270	17-Jan
18-Jan	0-45	46-61	62-124	125-226	227-270	18-Jan
19-Jan	0-46	47-62	63-125	126-227	228-270	19-Jan
20-Jan	0-46	47-62	63-126	127-229	230-270	20-Jan
21-Jan	0-46	47-63	64-127	128-230	231-270	21-Jan
22-Jan	0-47	48-63	64-127	128-232	233-270	22-Jan
23-Jan	0-47	48-64	65-128	129-233	234-270	23-Jan
24-Jan	0-47	48-64	65-129	130-235	236-270	24-Jan
25-Jan	0-48	49-64	65-130	131-236	237-270	25-Jan
26-Jan	0-48	49-65	66-131	132-238	239-270	26-Jan
27-Jan	0-48	49-65	66-132	133-239	240-270	27-Jan
28-Jan	0-49	50-66	67-133	134-241	242-270	28-Jan
29-Jan	0-49	50-66	67-133	134-243	244-270	29-Jan
30-Jan	0-49	50-67	68-134	135-244	245-270	30-Jan
31-Jan	0-50	51-67	68-135	136-246	247-270	31-Jan
1-Feb	0-50	51-67	68-136	137-247	248-270	1-Feb
2-Feb	0-50	51-68	69-137	138-249	250-270	2-Feb
3-Feb	0-50	51-68	69-138	139-251	252-270	3-Feb
4-Feb	0-50	51-69	70-139	140-252	253-270	4-Feb
5-Feb	0-51	52-69	70-140	141-254	255-270	5-Feb
6-Feb	0-51	52-70	71-141	142-256	257-270	6-Feb
7-Feb	0-52	53-70	71-142	143-257	258-270	7-Feb
8-Feb	0-52	53-71	72-143	144-259	260-270	8-Feb
9-Feb	0-53	54-71	72-143	144-261	262-270	9-Feb
10-Feb	0-53	54-72	73-144	145-262	263-270	10-Feb
11-Feb	0-53	54-72	73-145	146-264	265-270	11-Feb
12-Feb	0-54	55-72	73-146	147-266	267-270	12-Feb
13-Feb	0-54	55-73	74-147	148-268	269-270	13-Feb
14-Feb	0-54	55-73	74-148	149-269	270-270	14-Feb
15-Feb	0-55	56-74	75-149	150-270	end lg fall	15-Feb

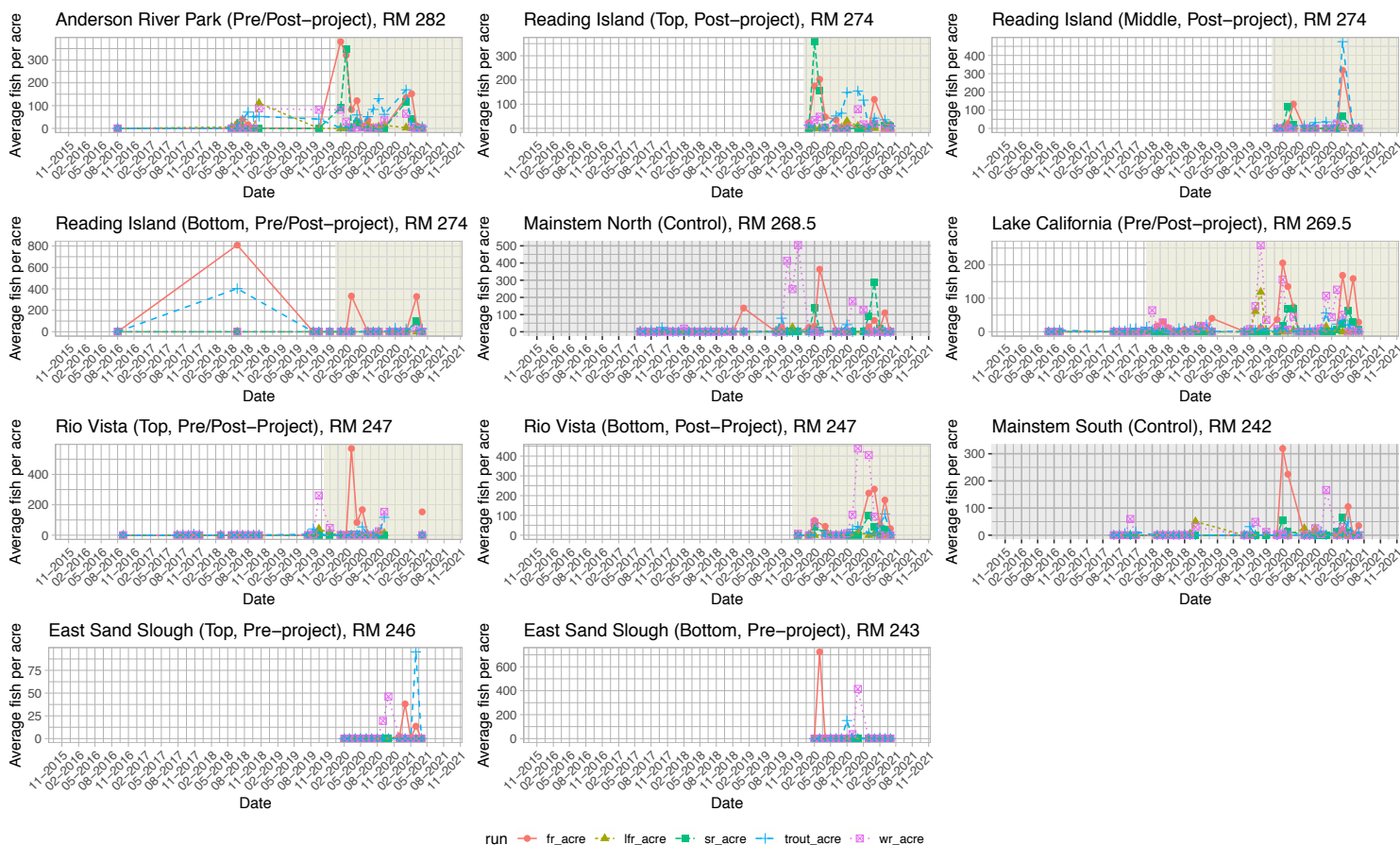
APPENDIX C: RAW SNORKEL DATA

Northern Sites



Monthly averages of fish-per-acre for northern sites (above RM 287). Light gray shading represents control sites, white shading indicates baseline data in restored sites (pre-project), and khaki shading represents impact data in restored sites (post-project). Large panels from each site are available starting on page 8 of this Appendix, to allow better examination of detailed trends. Note that fall run, late-fall run, spring run, and winter run refer to Chinook Salmon. Trout refers to steelhead/Rainbow Trout.

Southern Sites

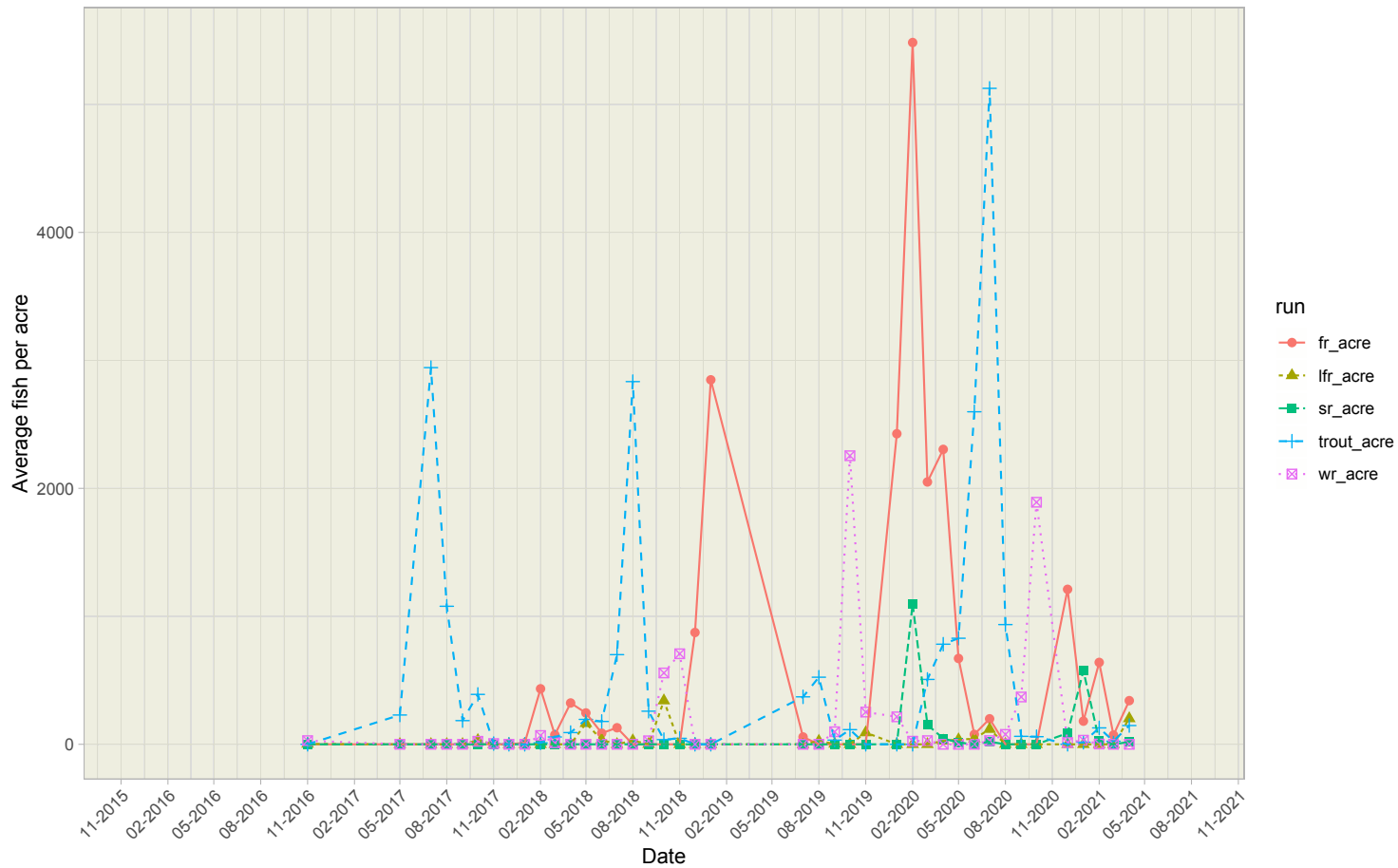


Monthly averages of fish-per-acre for southern sites (below RM 287). Light gray shading represents control sites, white shading indicates baseline data in restored sites (pre-project), and khaki shading represents impact data in restored sites (post-project). Large panels from each site are available starting on page 8 of this Appendix, to allow better examination of detailed trends. Note that fall run, late-fall run, spring run, and winter run refer to Chinook Salmon. Trout refers to steelhead/Rainbow Trout.

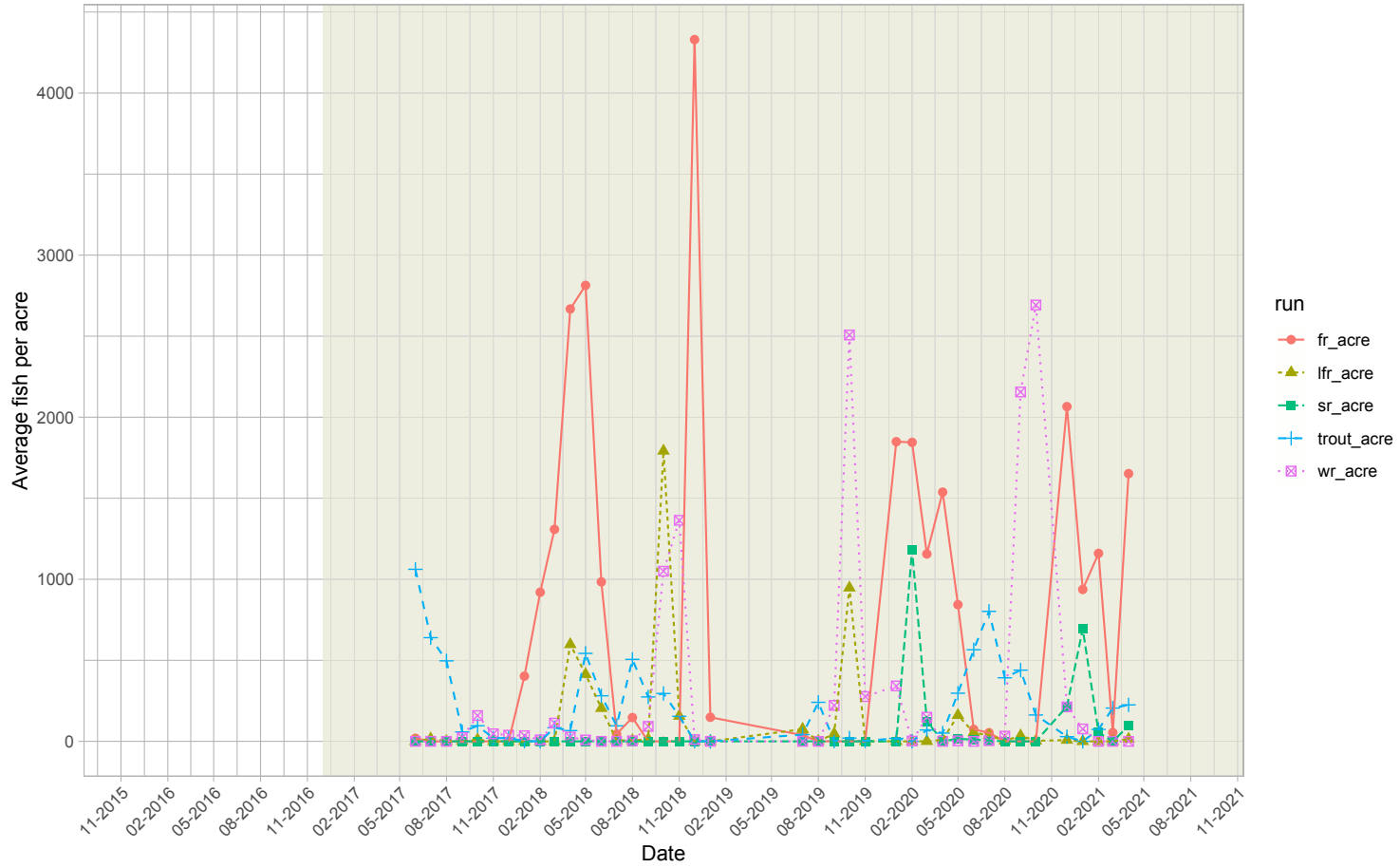
Larger Panels of Individual Sites

In each of the following panels, light gray shading represents control sites, white shading indicates baseline data in restored sites (pre-project), and khaki shading represents impact data in restored sites (post-project). Note that fall run, late-fall run, spring run, and winter run refer to Chinook Salmon. Trout refers to steelhead/Rainbow Trout.

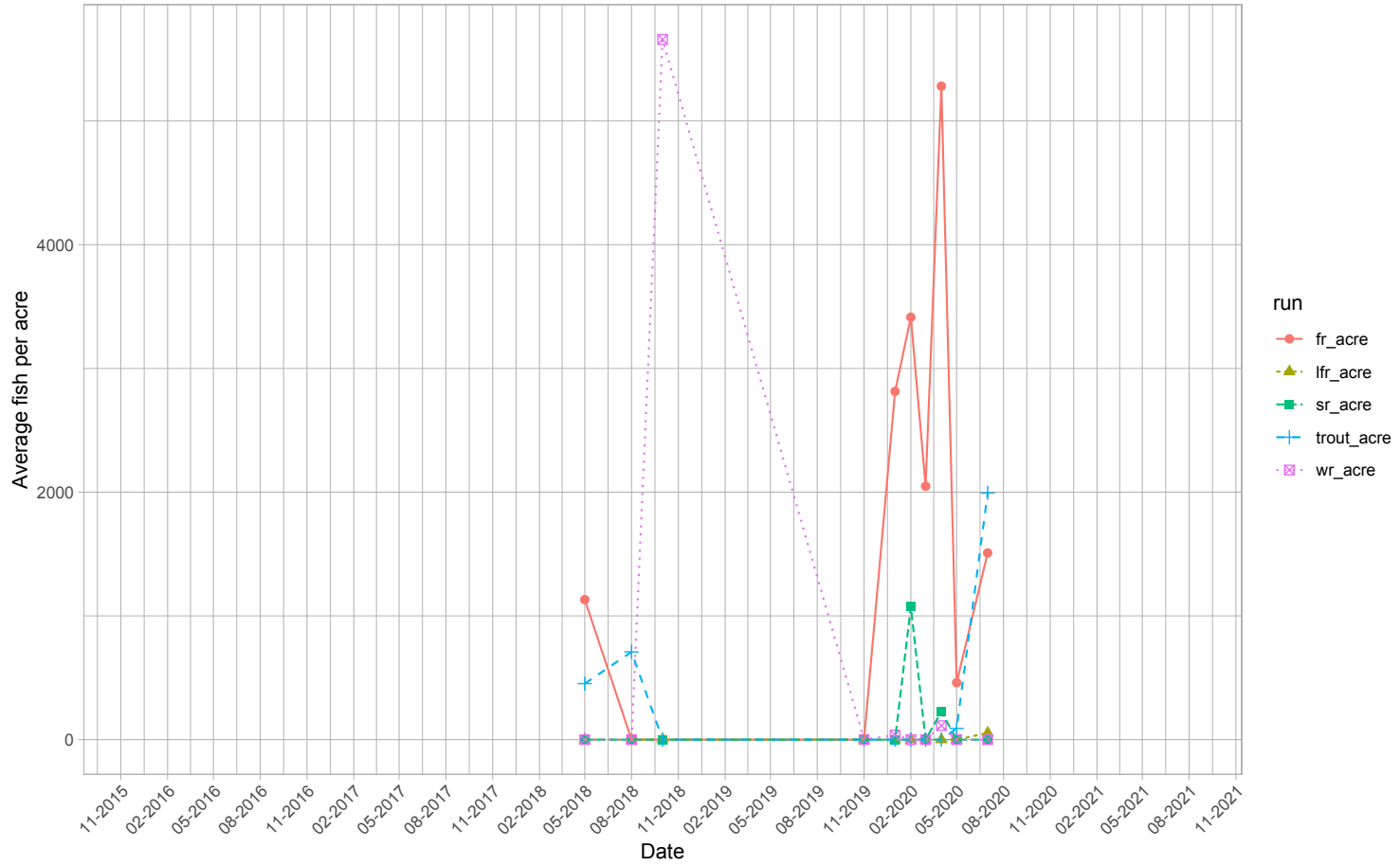
Painter's Riffle (Post-project), RM 296



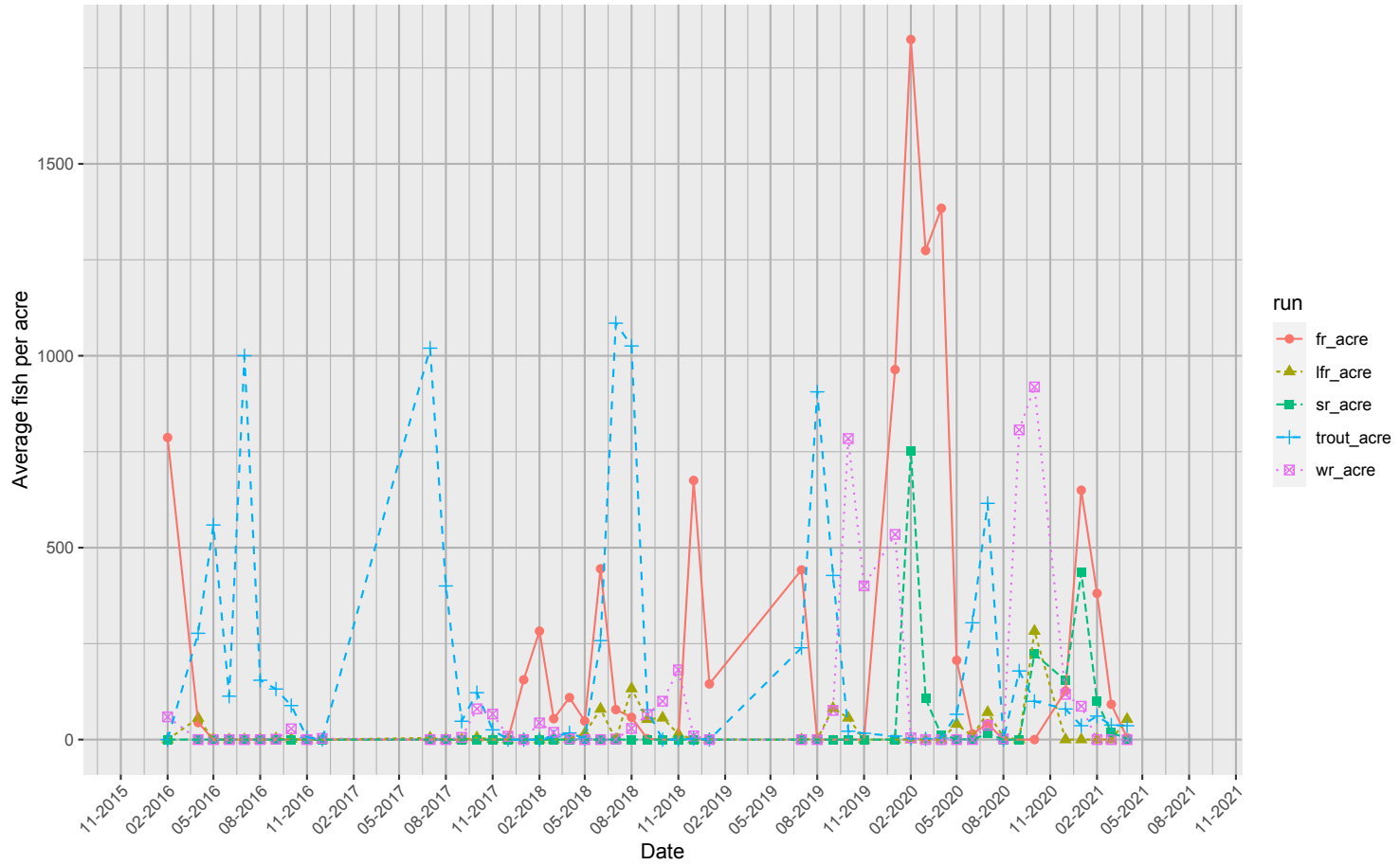
North Cypress (Post-project), RM 295.5



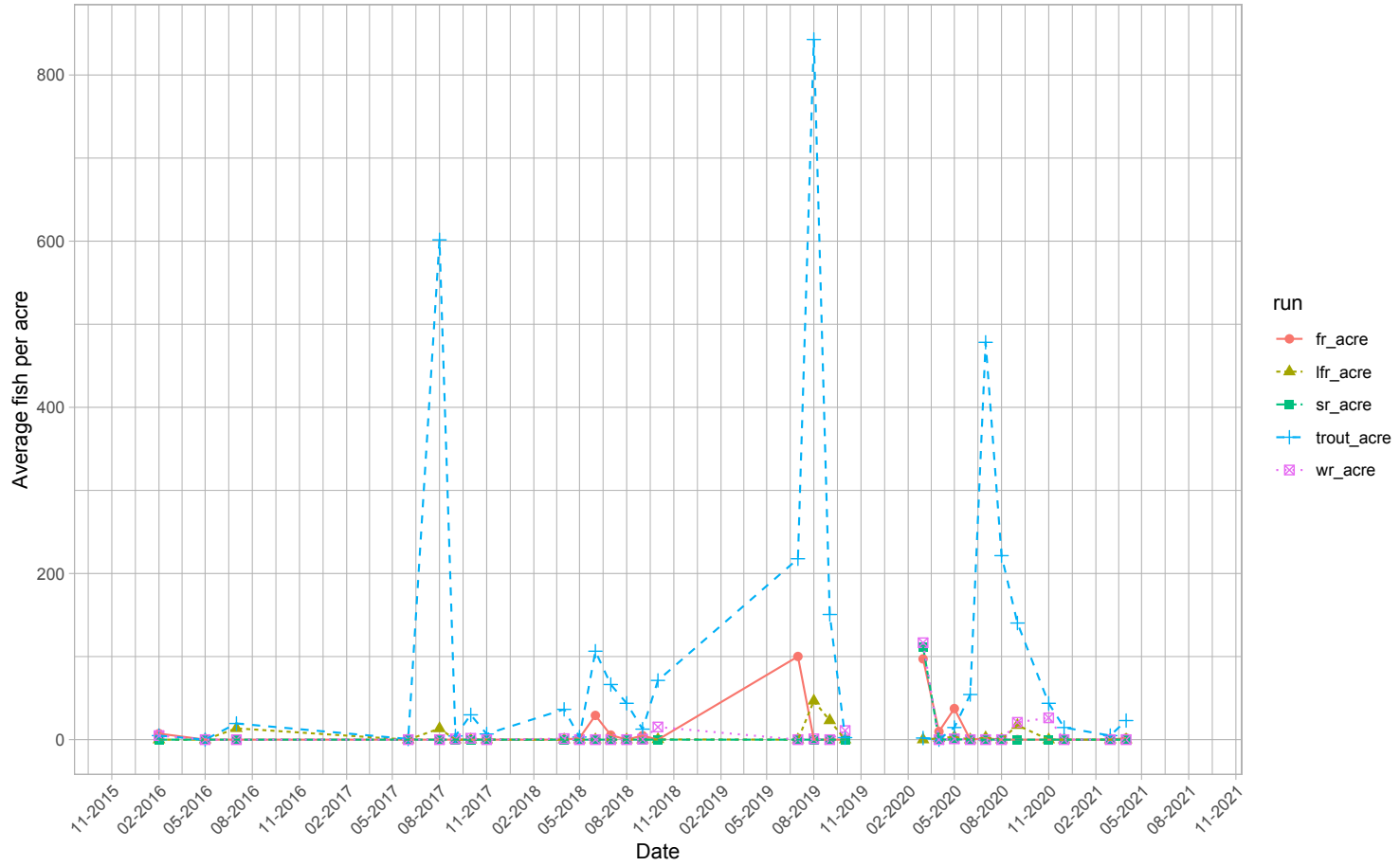
South Cypress (Pre-project), RM 294



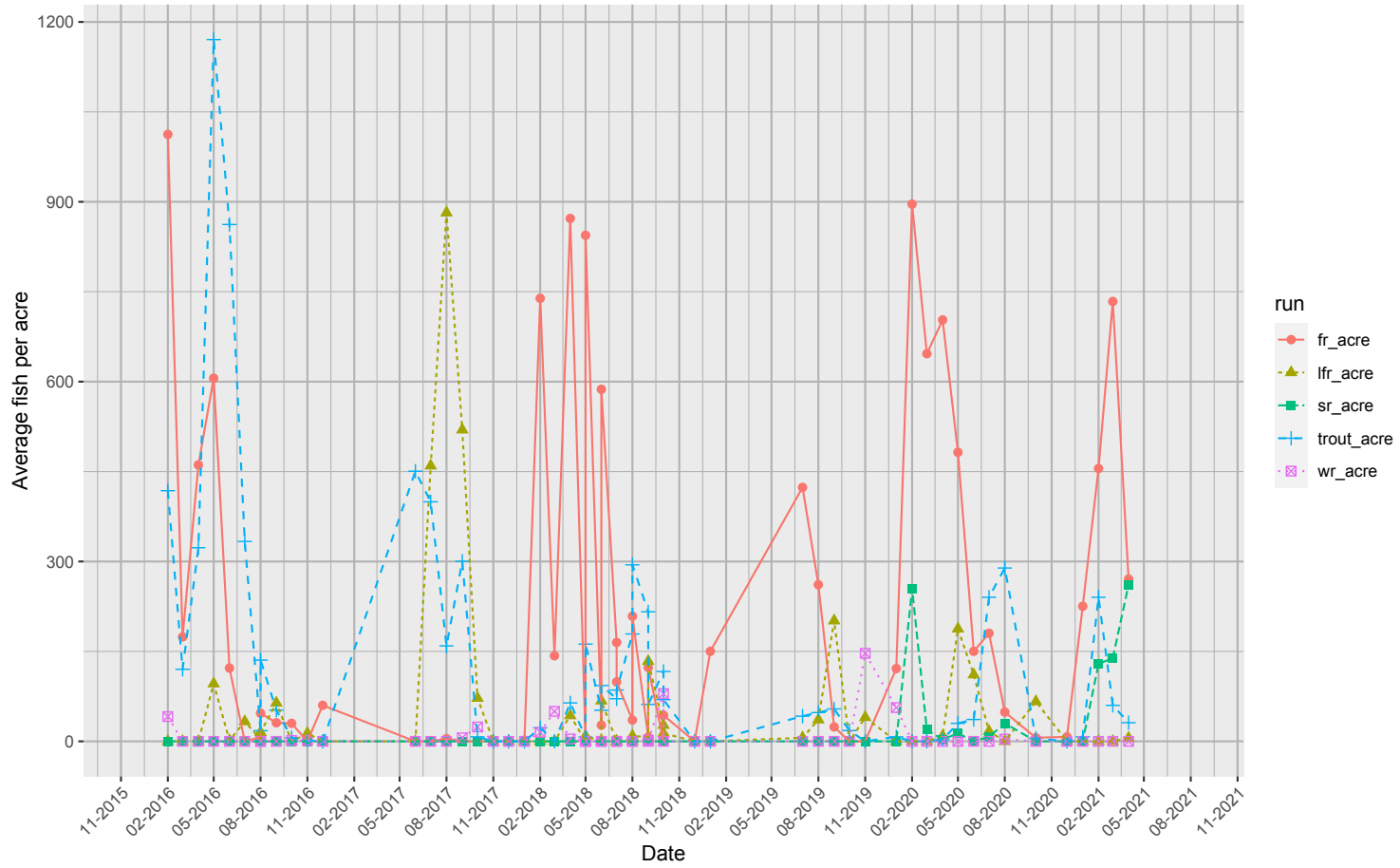
Wyndham (Control), RM 293.5



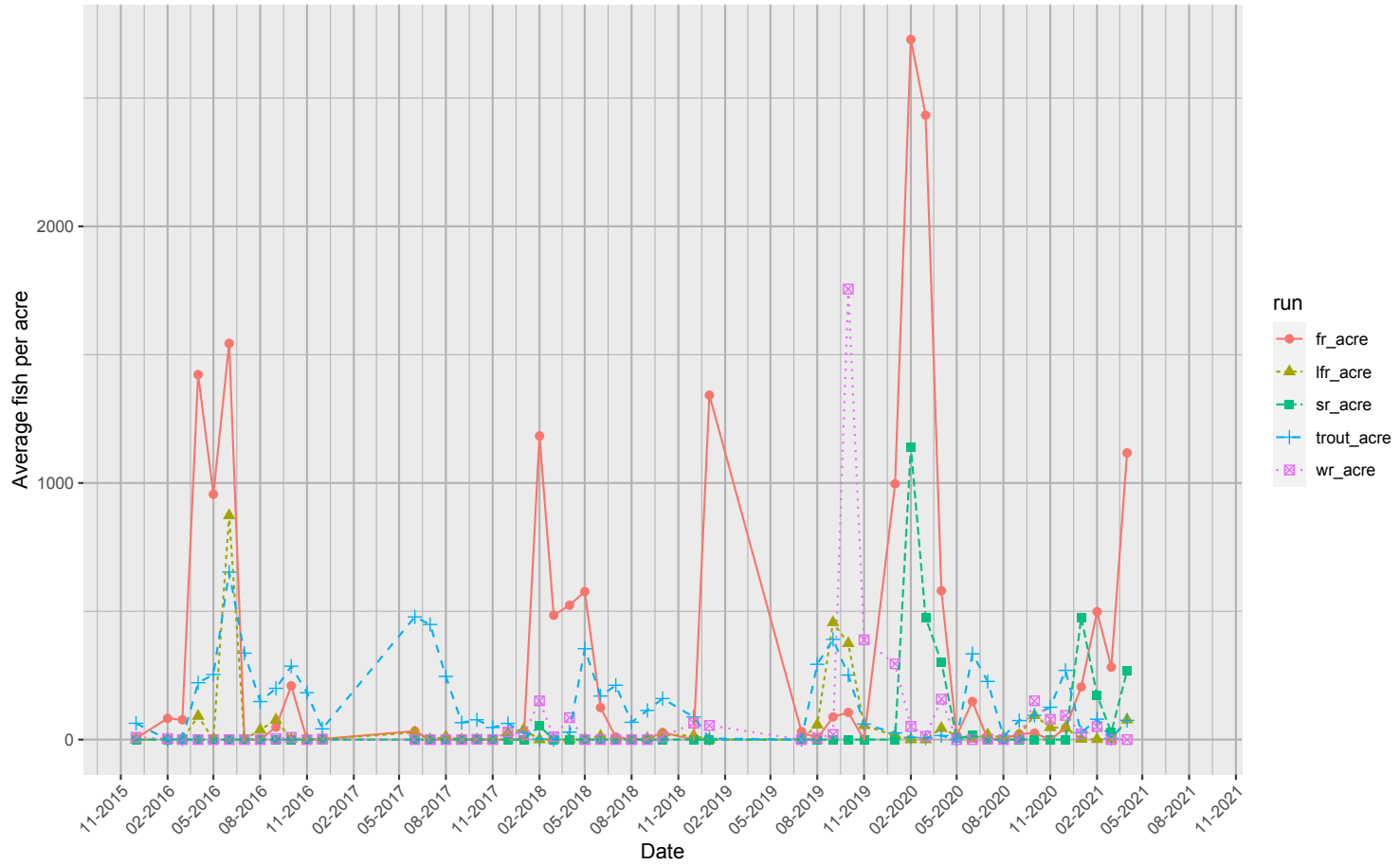
Shea Island (Pre-project), RM 290



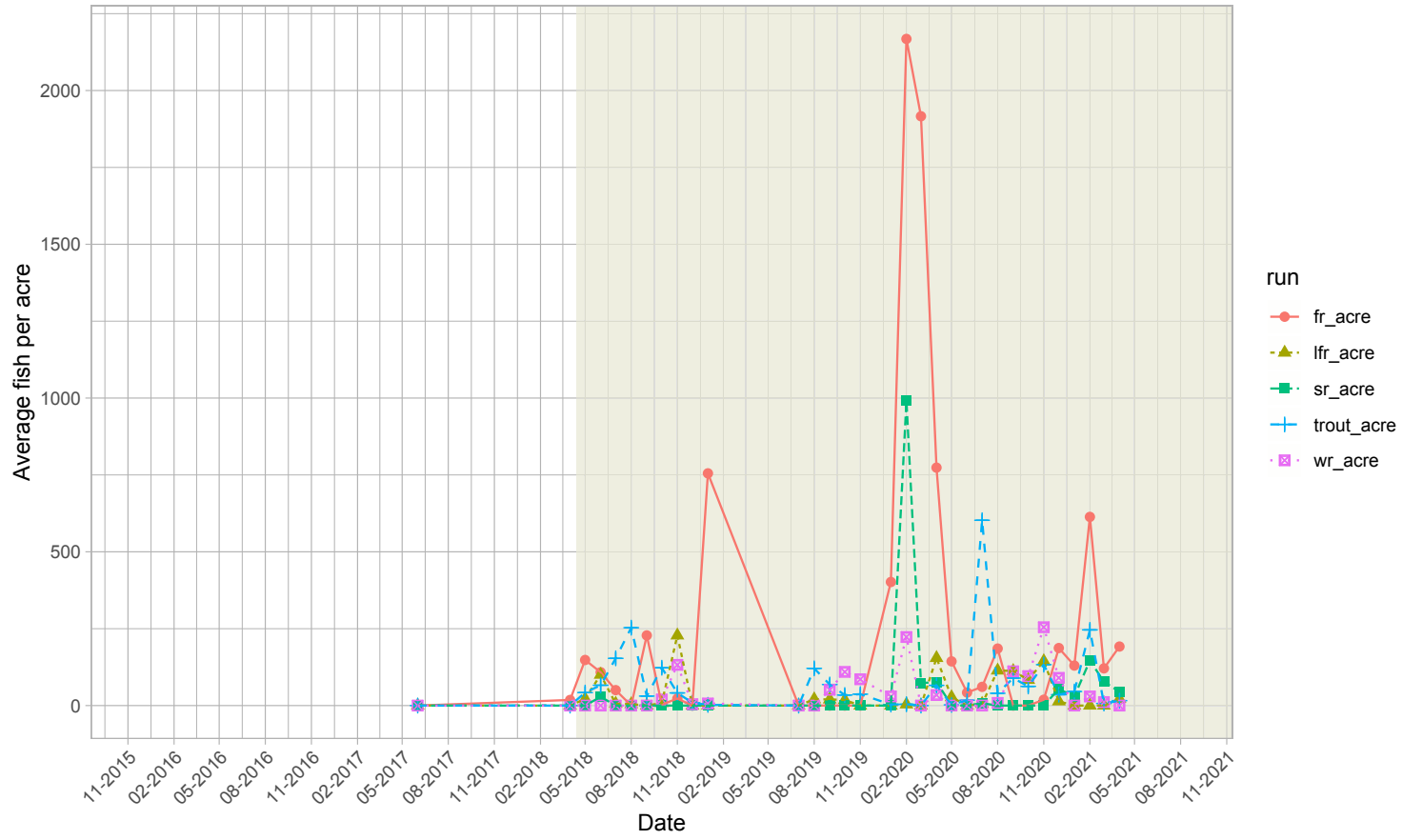
Clear Creek (Control), RM 289



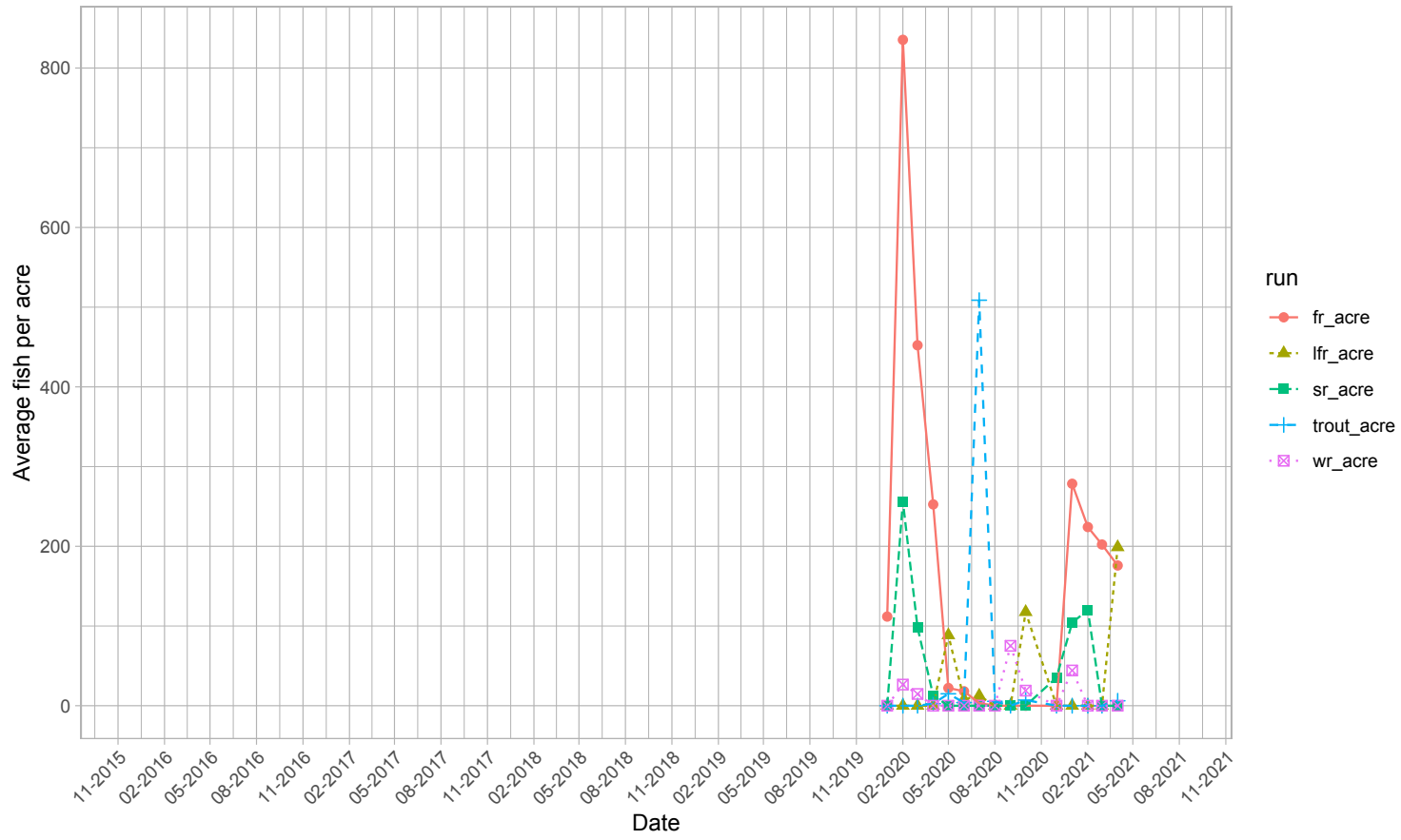
Bourbon Island (Control), RM 287.5



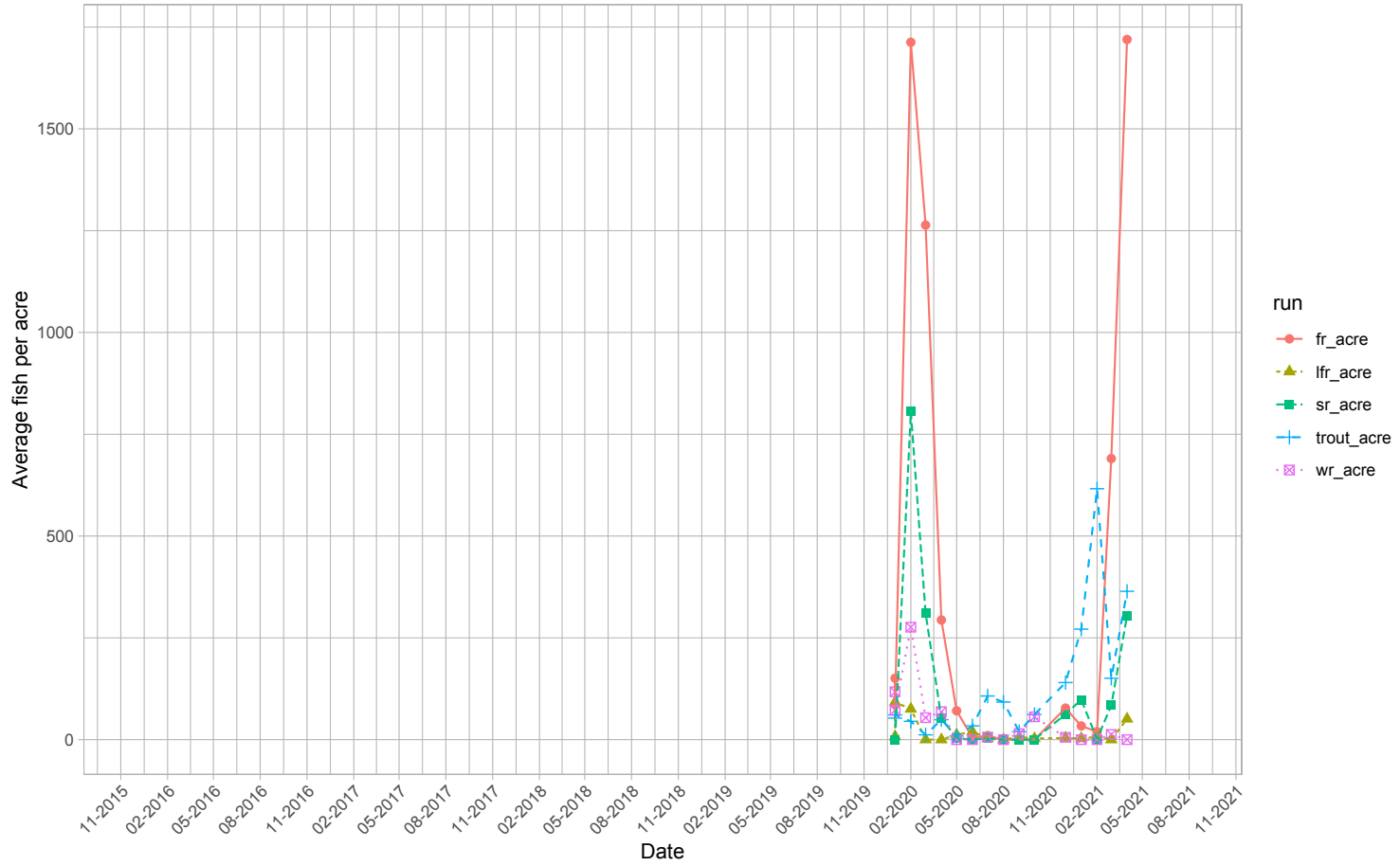
Kapusta 1A (Pre/Post-project), RM 287.5



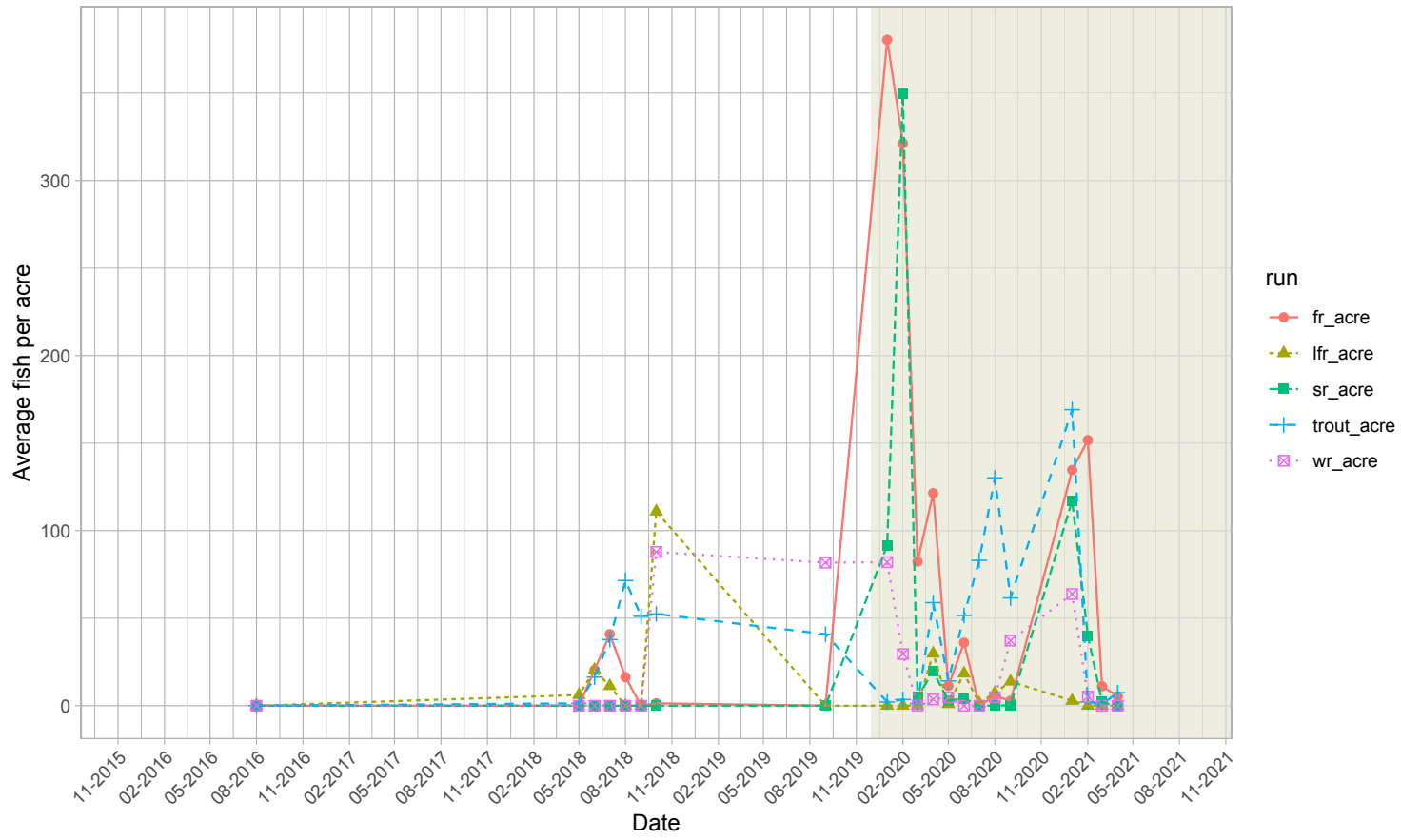
Kapusta 1B (Pre-project), RM 287



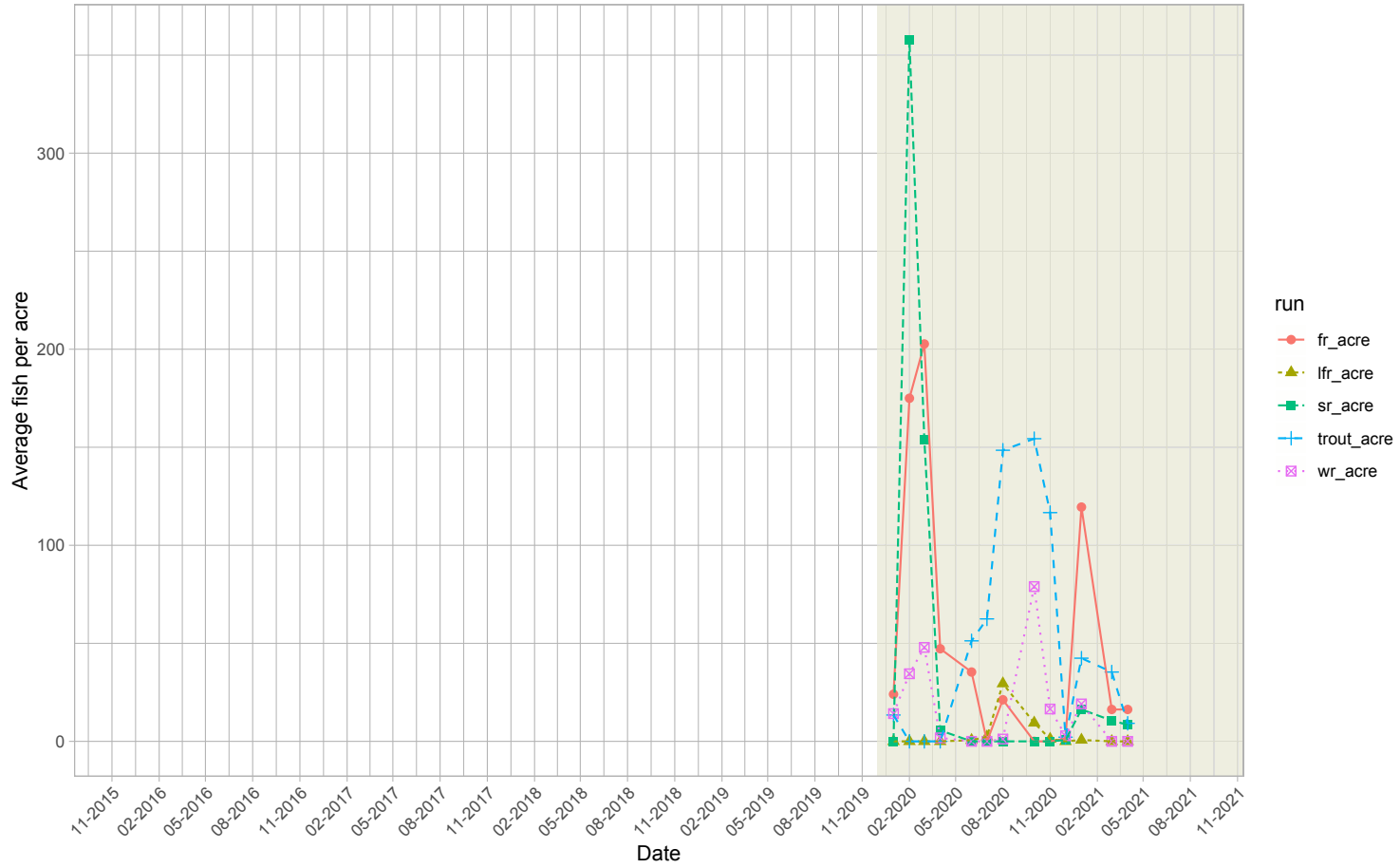
Kapusta Island (Pre-project), RM 287



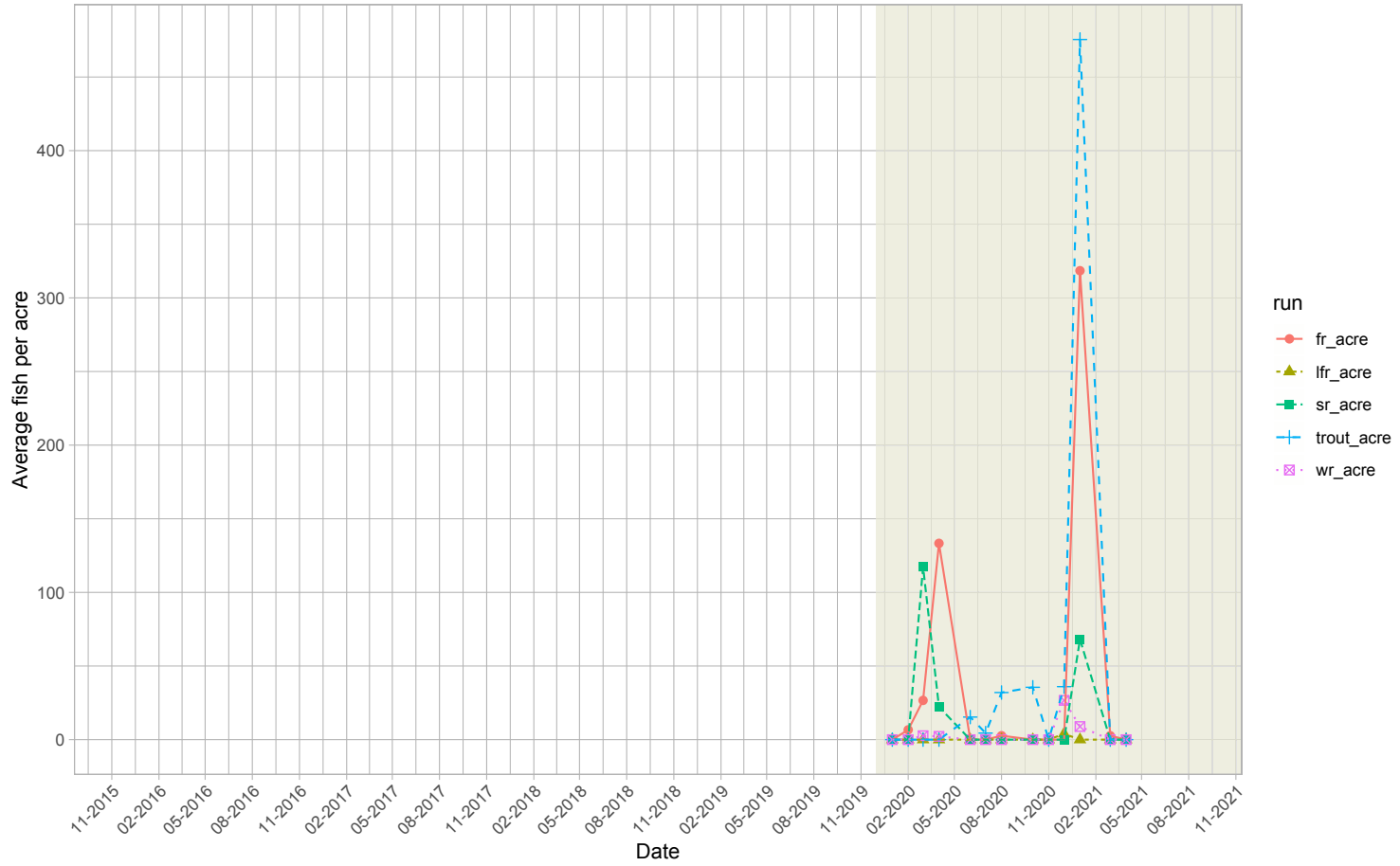
Anderson River Park (Pre/Post-project), RM 282



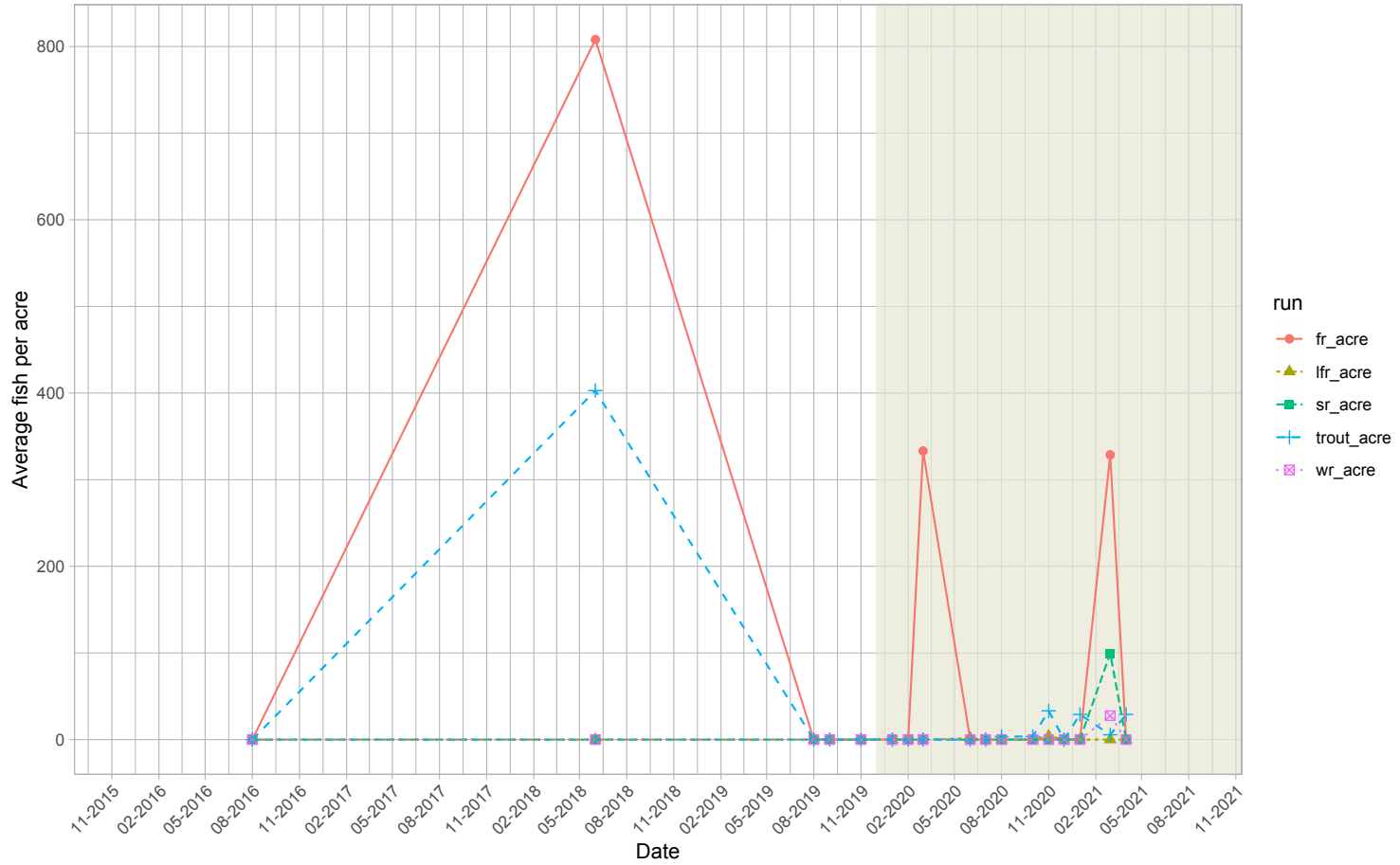
Reading Island (Top, Post-project), RM 274



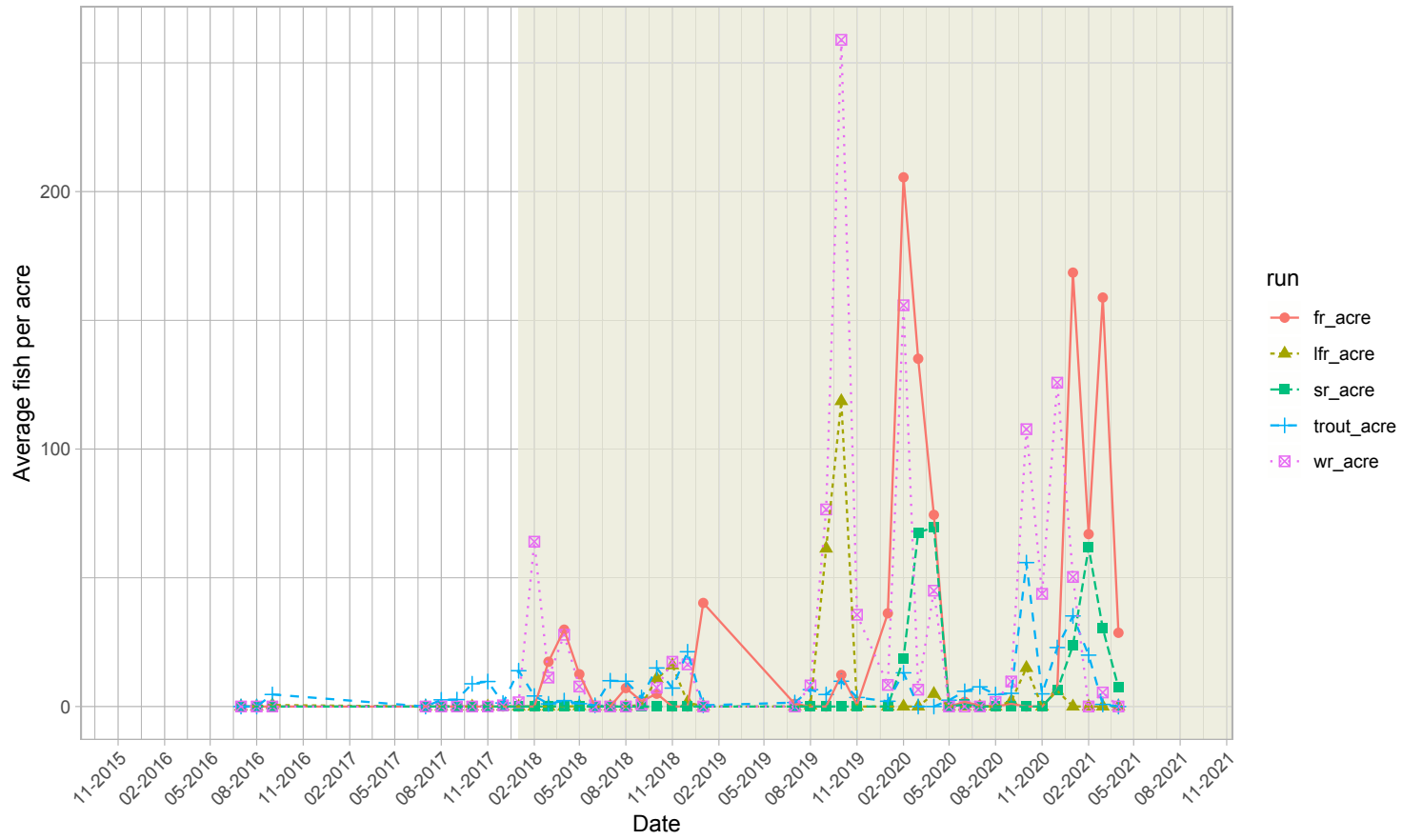
Reading Island (Middle, Post-project), RM 274



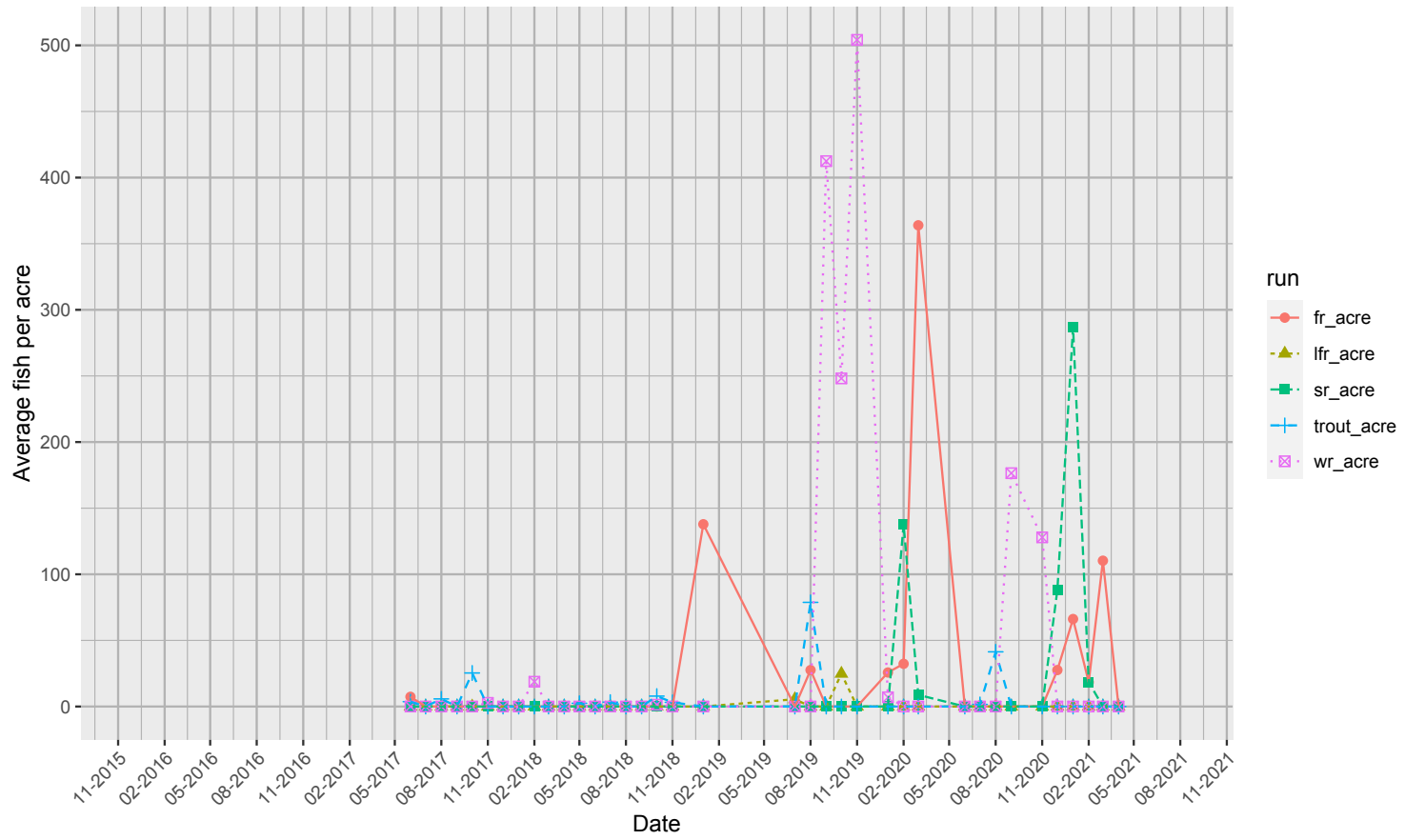
Reading Island (Bottom, Pre/Post-project), RM 274



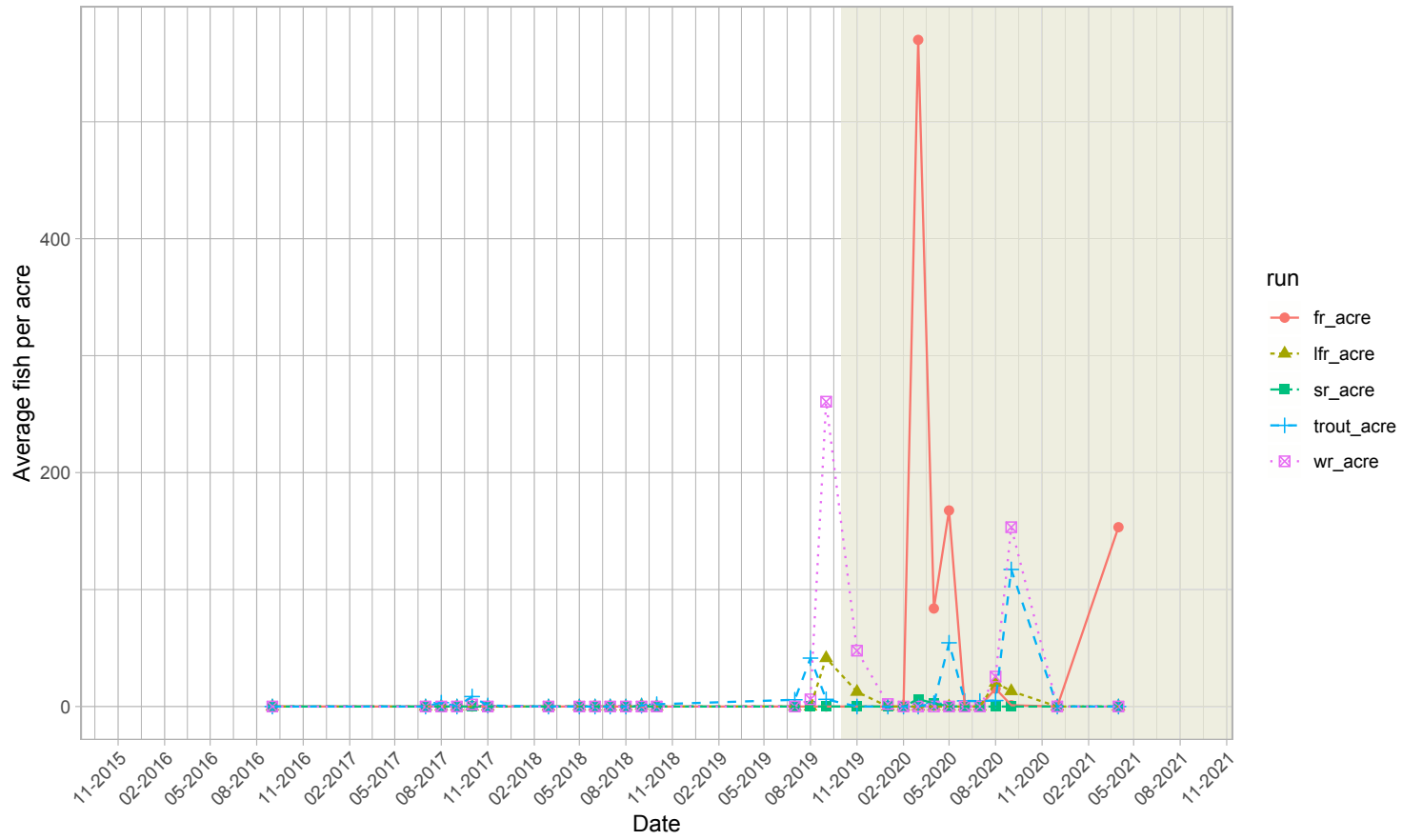
Lake California (Pre/Post-project), RM 269.5



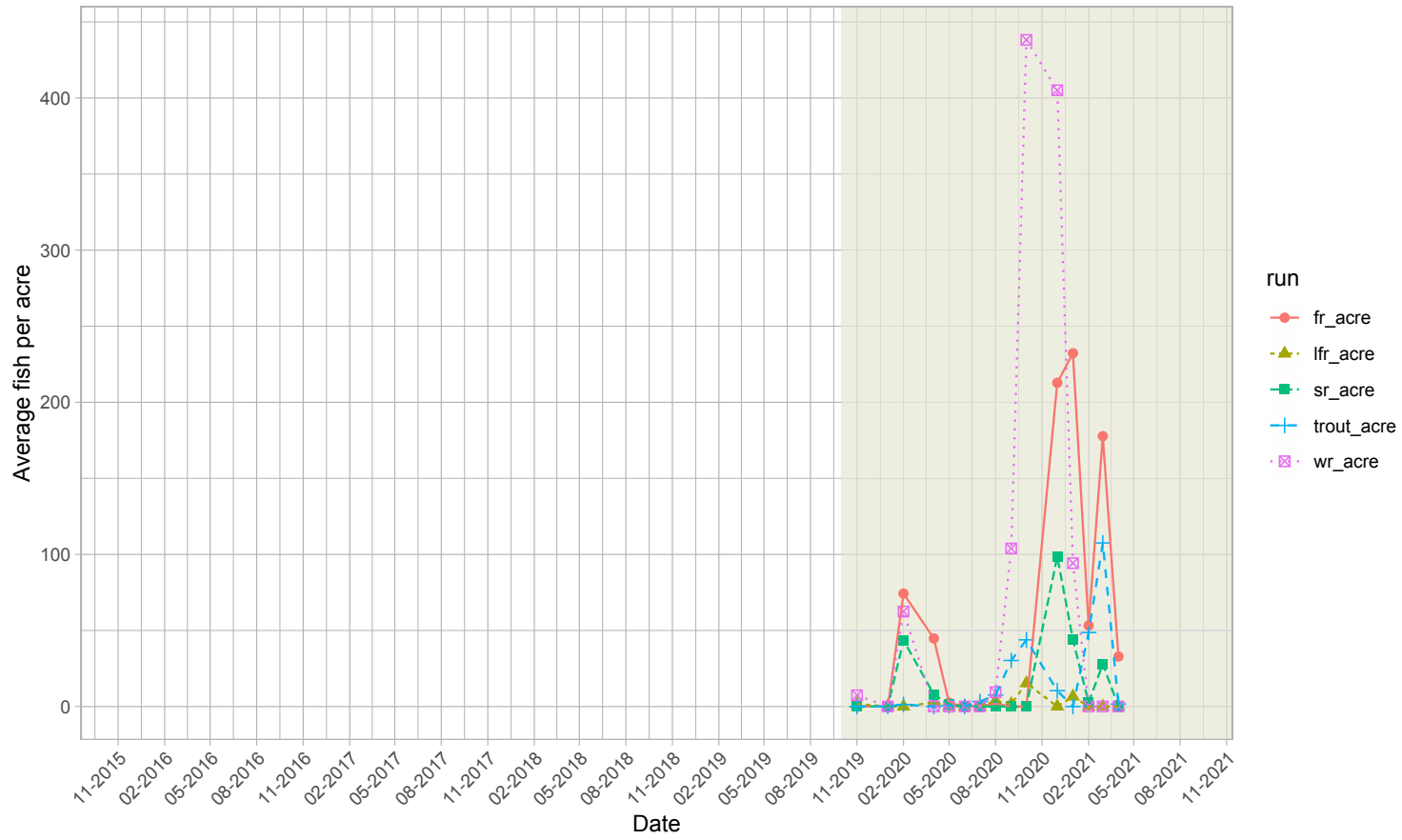
Mainstem North (Control), RM 268.5



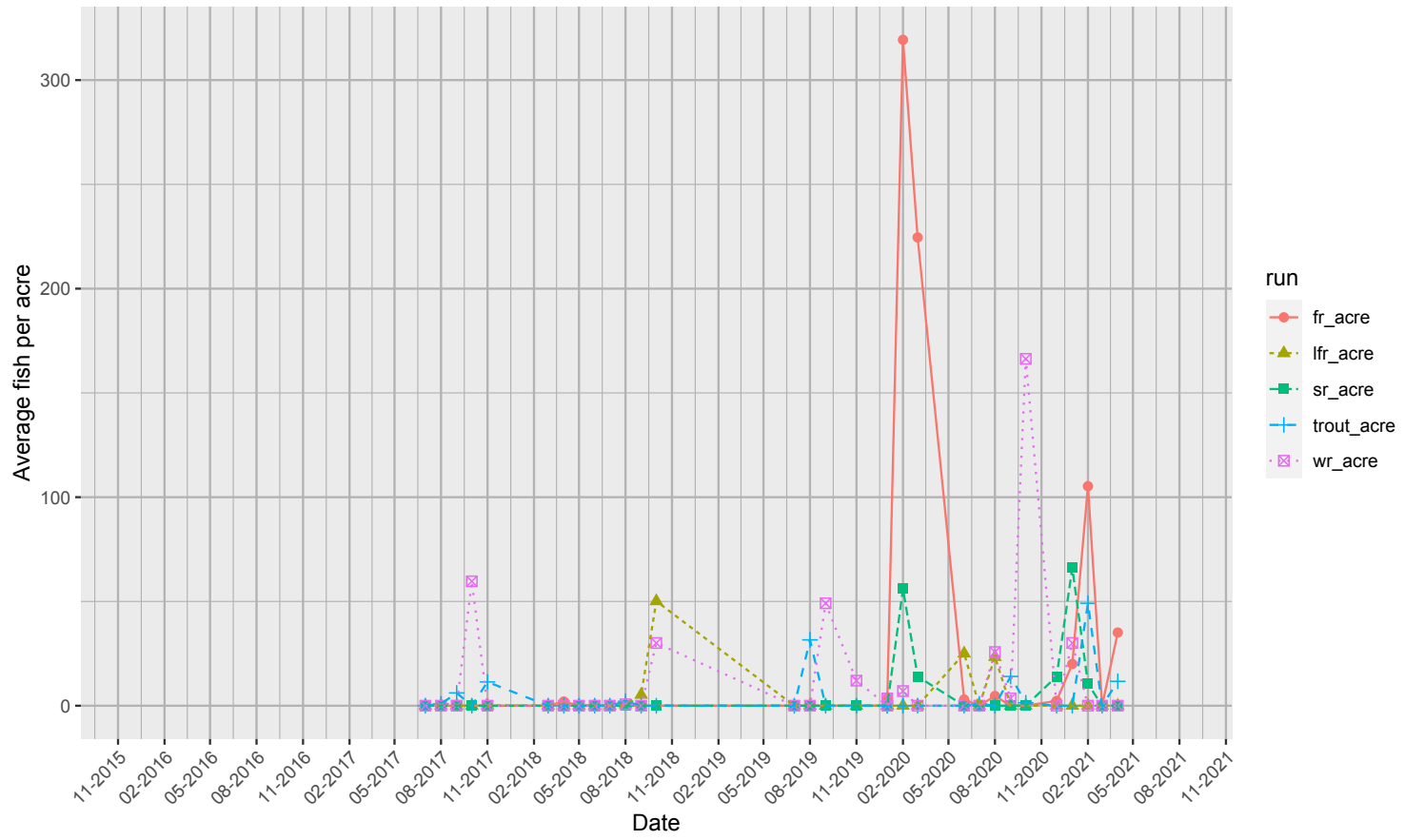
Rio Vista (Top, Pre/Post-Project), RM 247



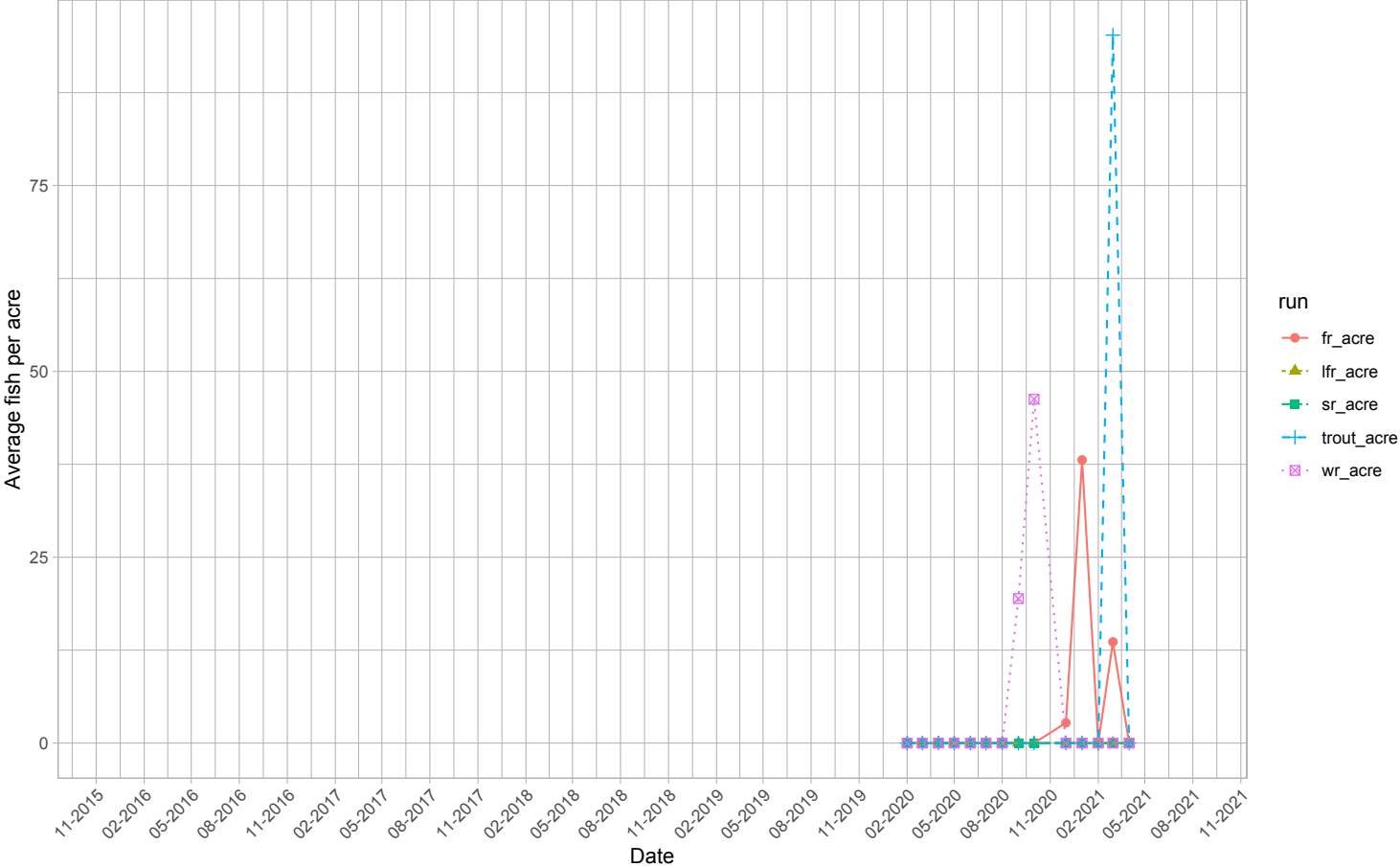
Rio Vista (Bottom, Post-Project), RM 247



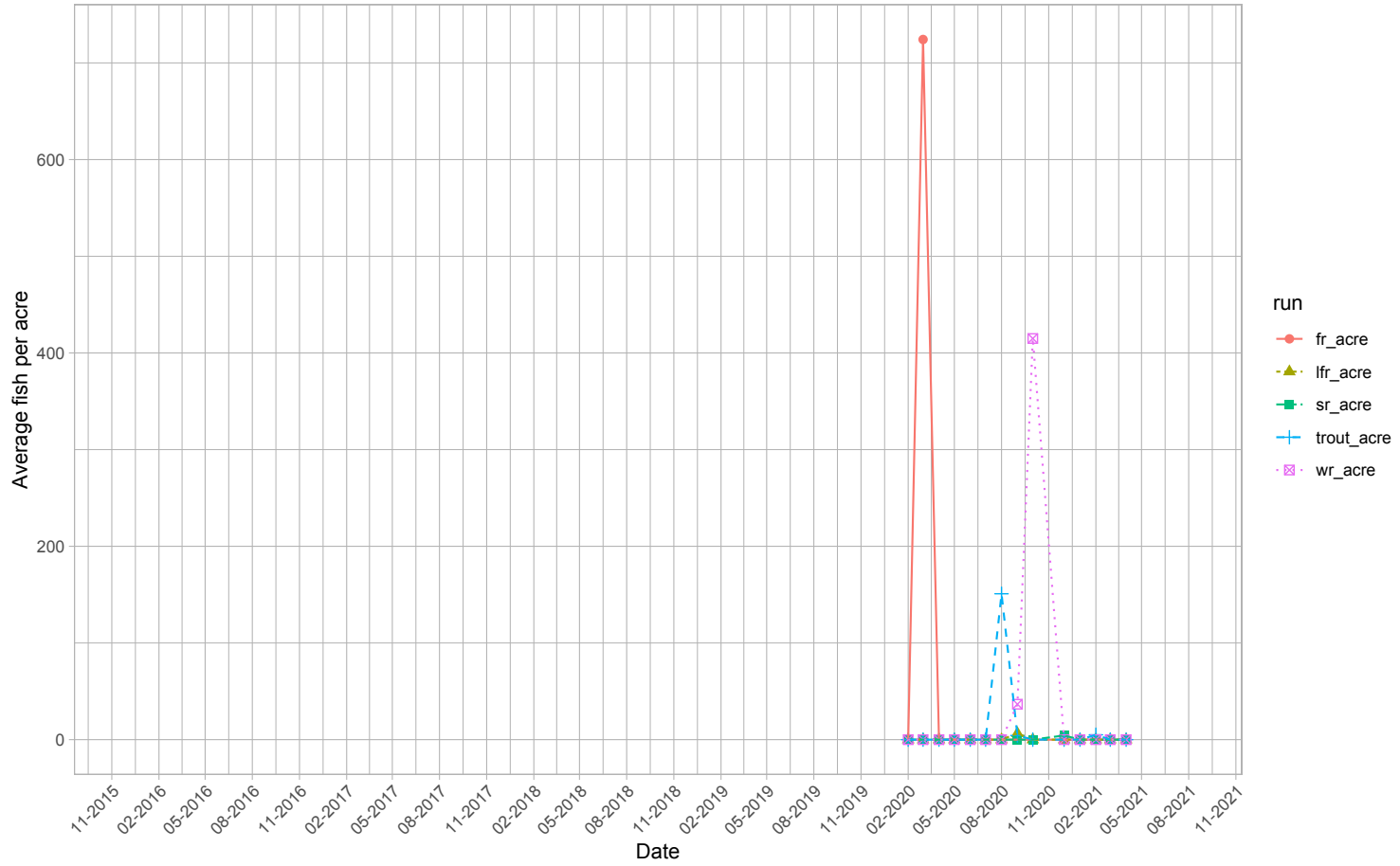
Mainstem South (Control), RM 242



East Sand Slough (Top, Pre-project), RM 246



East Sand Slough (Bottom, Pre-project), RM 243



APPENDIX D: HABITAT MAPS (NO COBBLE OR AQUATIC VEGETATION)

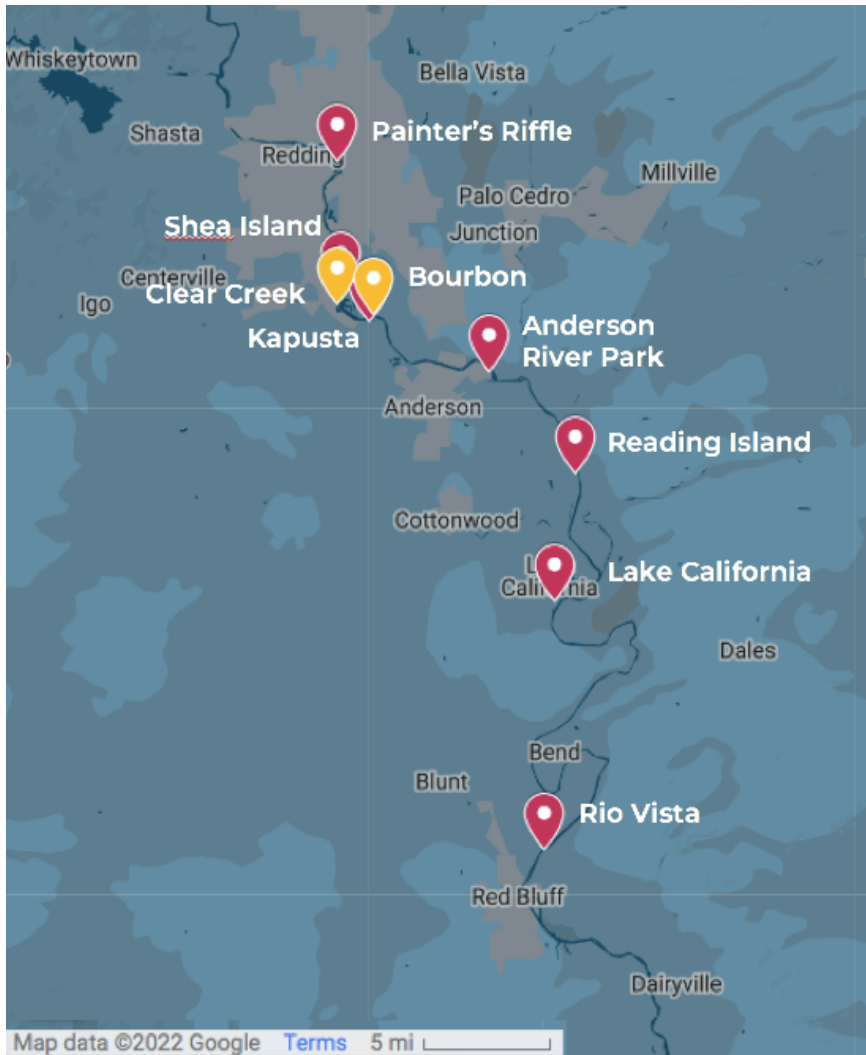
Note: Due to file size limitations, this appendix only contains maps from this reporting period, shown in the table below. Additional maps can be found in the appendix of the 2019-20 Annual Report.

Table of Mapped Sites

Site Description	Flow (CFS)
Anderson River Park (Impact)	
<i>Pre-restoration Phase 2 (Lower)</i>	7,000
<i>Pre-restoration Phase 3 (Lower)</i>	7,000
<i>Post-restoration Phase 2 (Lower)</i>	3,250
<i>Post-restoration Phase 2 (Upper)</i>	3,250
<i>Post-restoration Phase 3 (Lower)</i>	3,250
Bourbon Island (Control)	3,500
Clear Creak (Control)	3,500
Kapusta 1A (Impact)	3,250
Kapusta Island (Impact)	3,500
Lake California (Impact)	
<i>Lower</i>	3,250 and 6,750
<i>Middle</i>	3,250 and 6,750
<i>Upper</i>	3,250 and 6,750
Painter's Riffle (Impact)	3,250
Reading Island (Impact)	
<i>Lower</i>	3,250
<i>Middle</i>	3,250
<i>Upper</i>	3,250
Rio Vista (Impact)	
<i>Lower</i>	3,250
<i>Middle</i>	3,250
<i>Upper</i>	3,250
Shea Island (Impact)	
<i>Lower</i>	3,250
<i>Upper</i>	3,250

Location of mapped sites

Red locations are project sites. Orange locations are control sites.



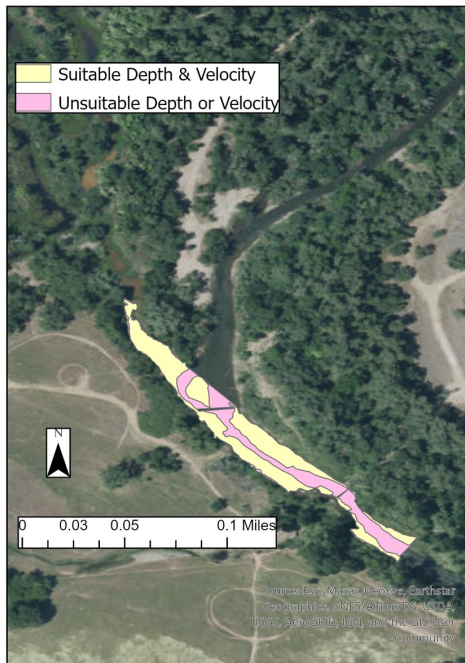
Anderson River Park (Baseline & Impact)

Pre-Restoration

Phase 2 (Lower) – 7,000 CFS

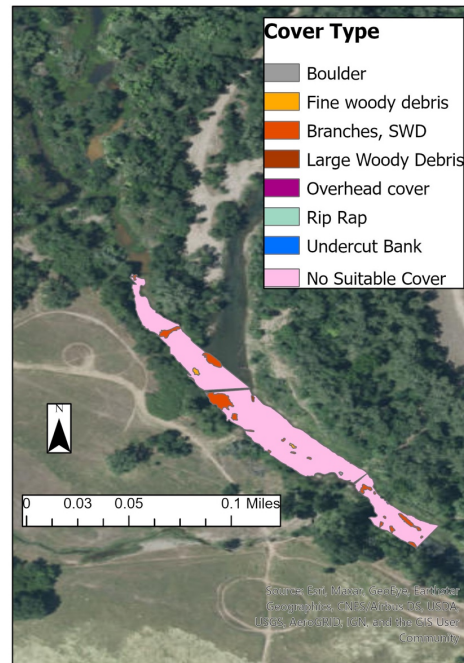
Pre Restoration Habitat Mapping: Anderson River Park Phase 2 (Lower) Keswick Release 7,000 CFS

Depth & Velocity Mapping



*Dates mapped: 10-2-20

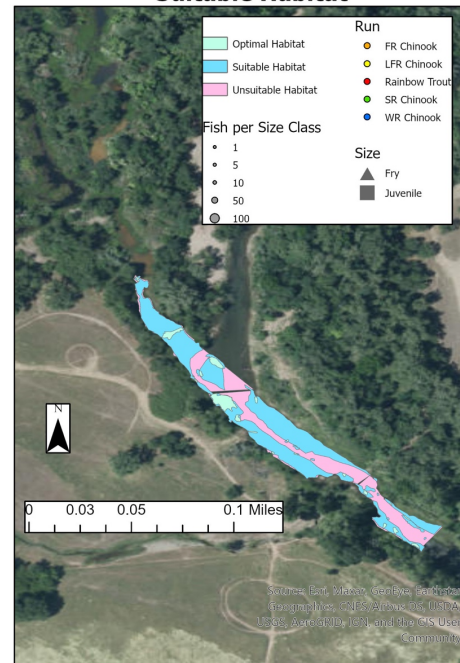
Cover from Predators



*Dates mapped: 10-5-20

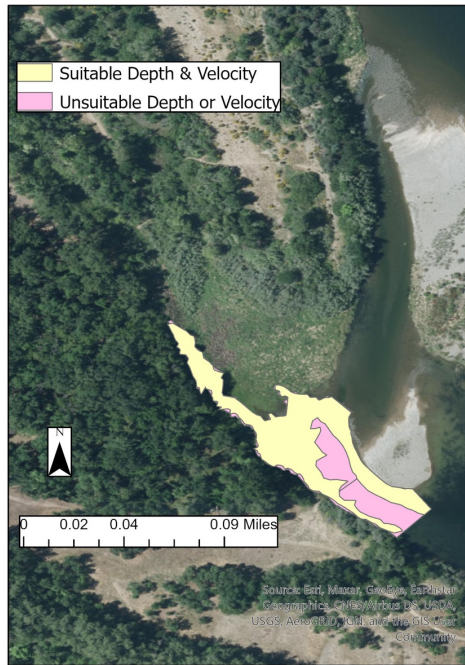
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



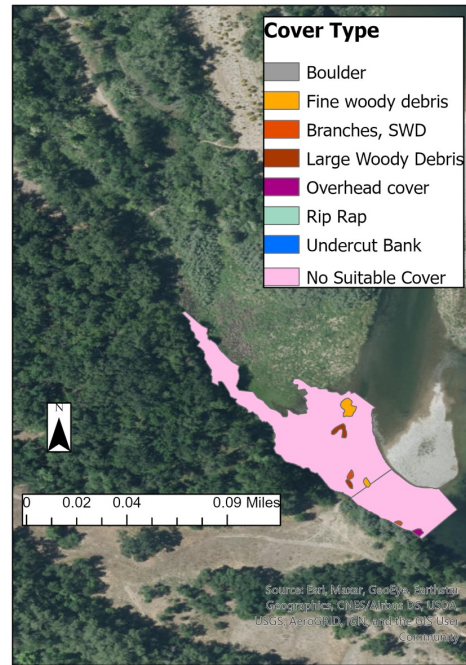
Pre Restoration Habitat Mapping: Anderson River Park Phase 3 (Lower) Keswick Release 7,000 CFS

Depth & Velocity Mapping



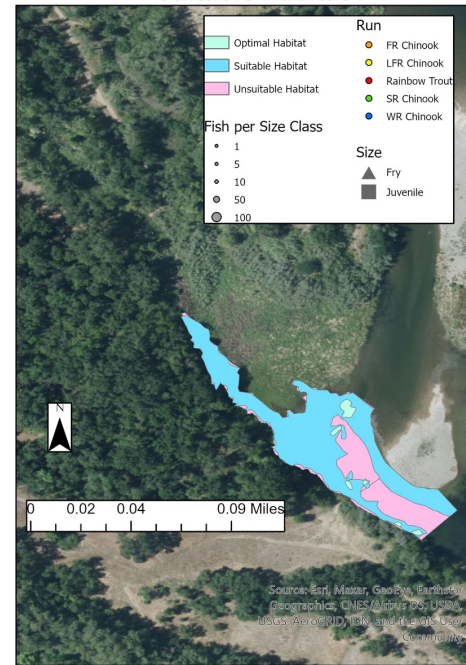
*Dates mapped: 10-6-20

Cover from Predators



*Dates mapped: 10-7-20
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat

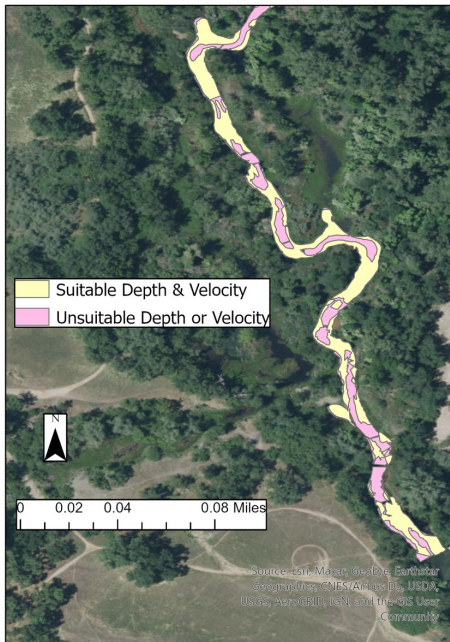


Post-Restoration

Phase 2 (Lower) – 3,250 CFS

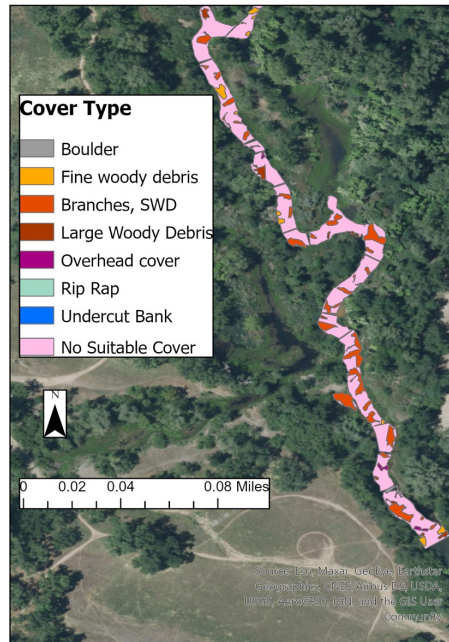
**Post Restoration Habitat Mapping: Anderson River Park Phase 2 (Lower)
Keswick Release 3,250 CFS**

Depth & Velocity Mapping



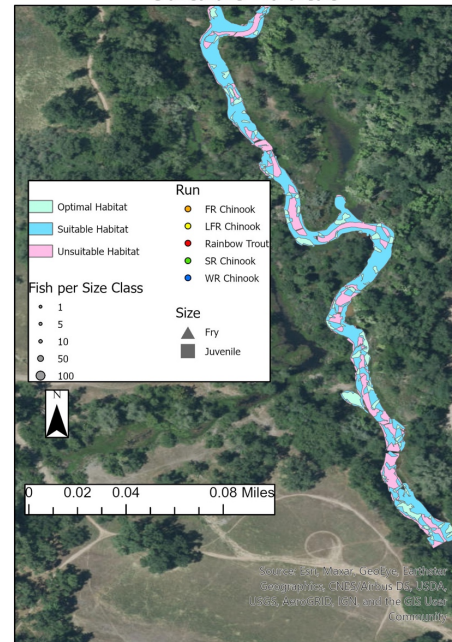
*Dates mapped: 2-9-21 & 2-11-21

Cover from Predators



*Dates mapped: 2-4-21
*Vegetation not included

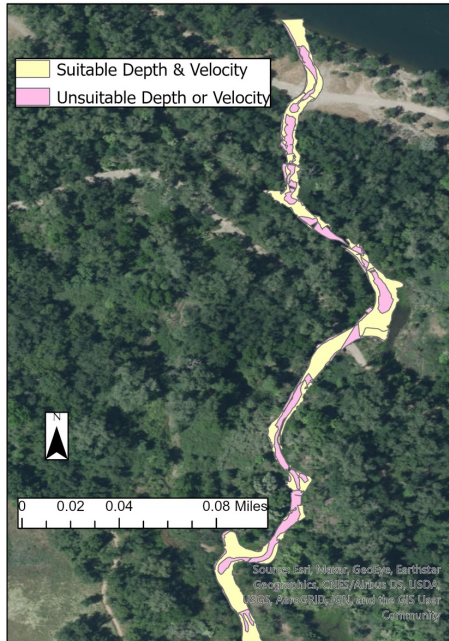
Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 3-24-21
*Keswick flow during snorkel: 3500 cfs

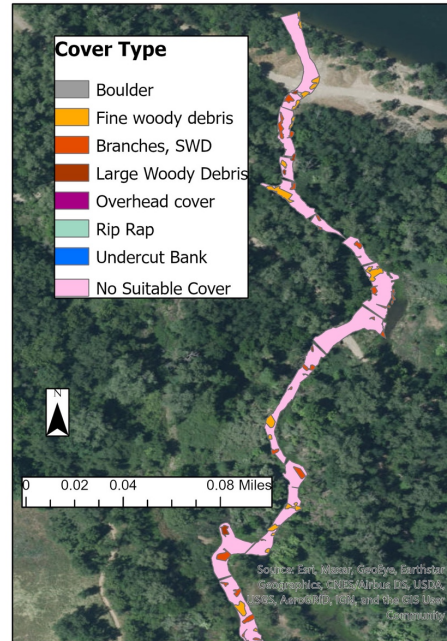
Post Restoration Habitat Mapping: Anderson River Park Phase 2 (Upper) Keswick Release 3,250 CFS

Depth & Velocity Mapping



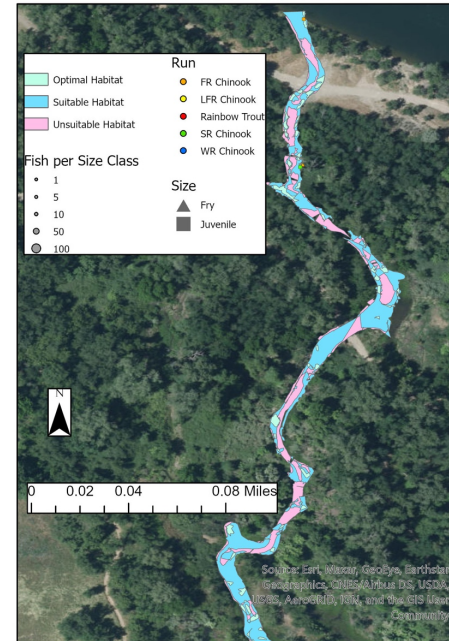
*Dates mapped: 2-9-21 & 2-11-21

Cover from Predators



*Dates mapped: 2-4-21
*Vegetation not included

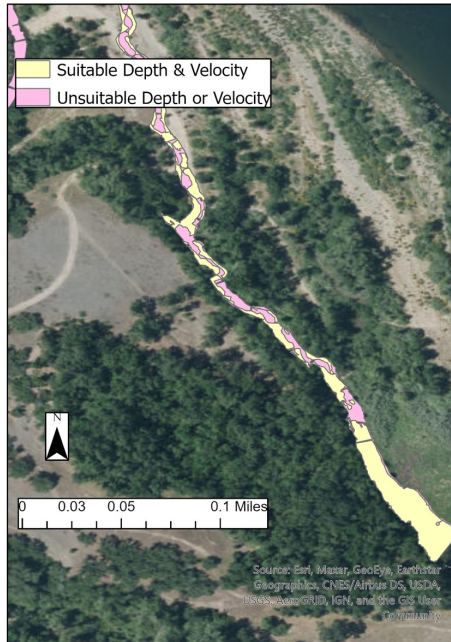
Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 3-24-21
*Keswick flow during snorkel: 3500 cfs

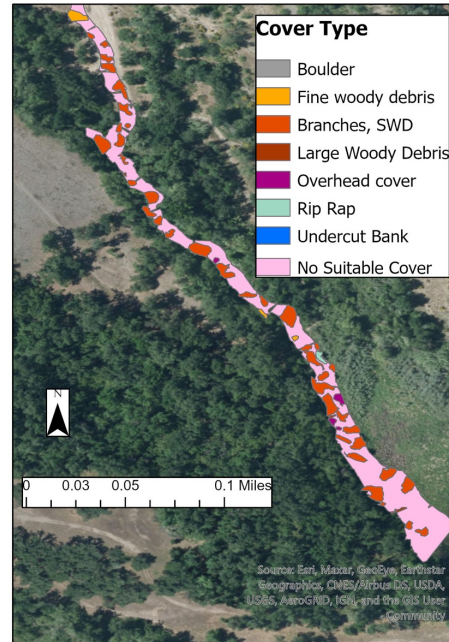
Post Restoration Habitat Mapping: Anderson River Park Phase 3 (Lower) Keswick Release 3,250 CFS

Depth & Velocity Mapping



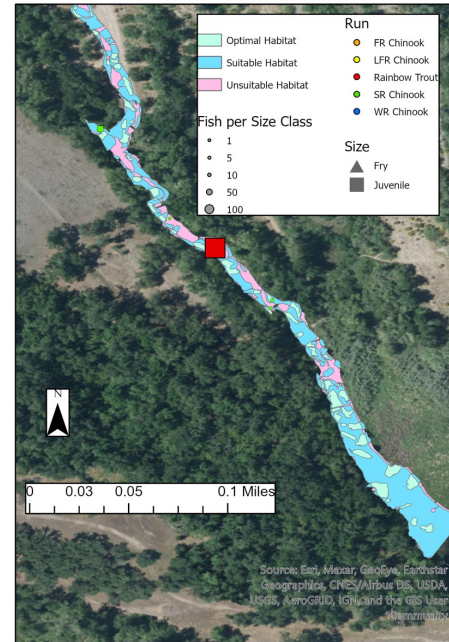
*Dates mapped: 1-28-21, 2-3-21, & 2-4-21

Cover from Predators



*Dates mapped: 2-8-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat

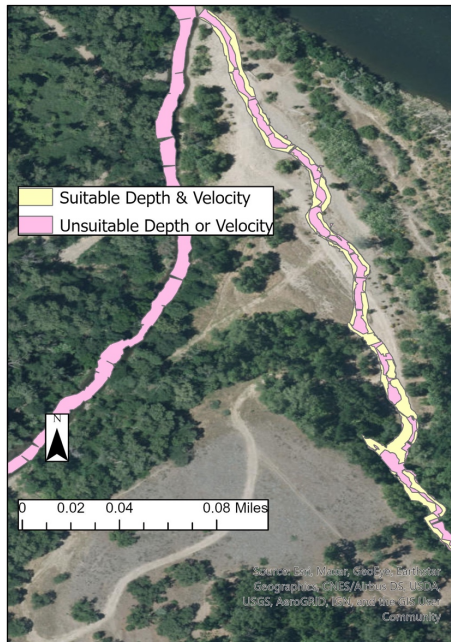


*Dates snorkeled: 3-25-21
*Keswick flow during snorkel: 3500 cfs

Phase 3 (Upper) – 3,250 CFS

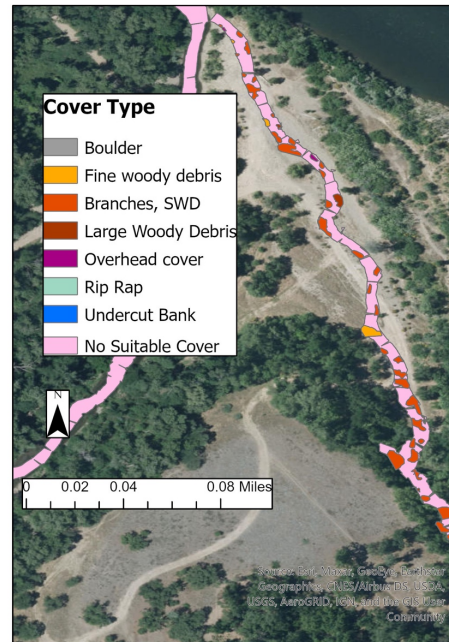
**Post Restoration Habitat Mapping: Anderson River Park Phase 3 (Upper)
Keswick Release 3,250 CFS**

Depth & Velocity Mapping



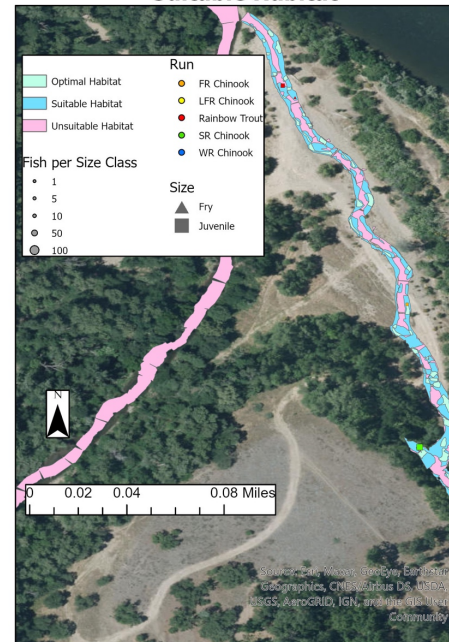
*Dates mapped: 1-28-21, 2-3-21, & 2-4-21

Cover from Predators



*Dates mapped: 2-8-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



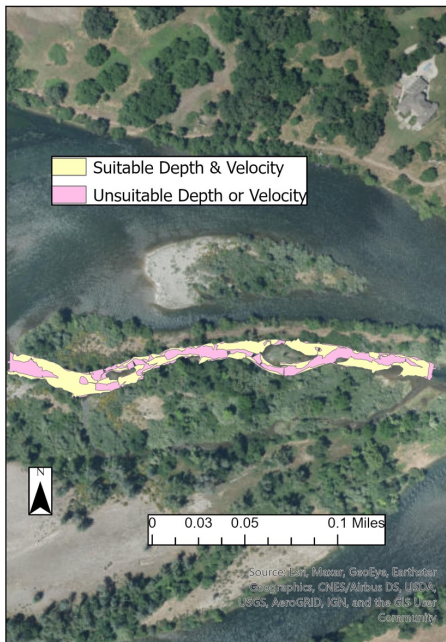
*Dates snorkeled: 3-25-21
*Keswick flow during snorkel: 3500 cfs

Bourbon Island (Control)

3,500 CFS

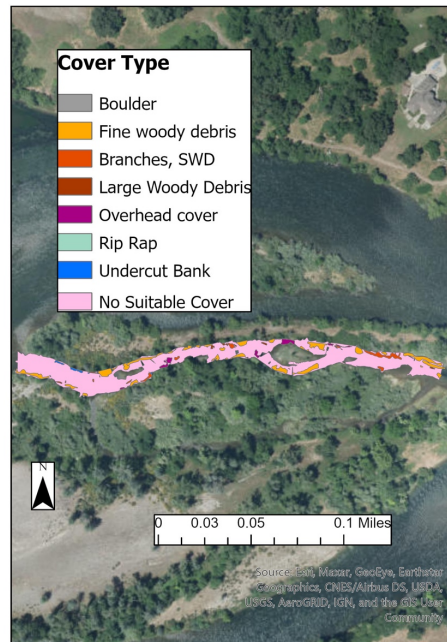
Control Site Habitat Mapping: Bourbon Keswick Release 3,500 CFS

Depth & Velocity Mapping



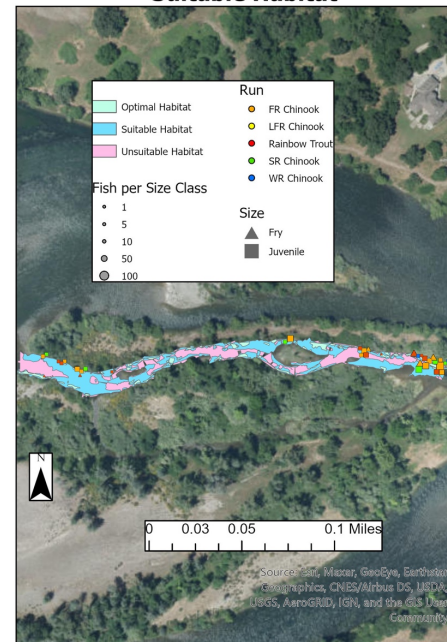
Dates mapped: 3-16-21 & 3-17-21

Cover from Predators



*Dates mapped: 3-15-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



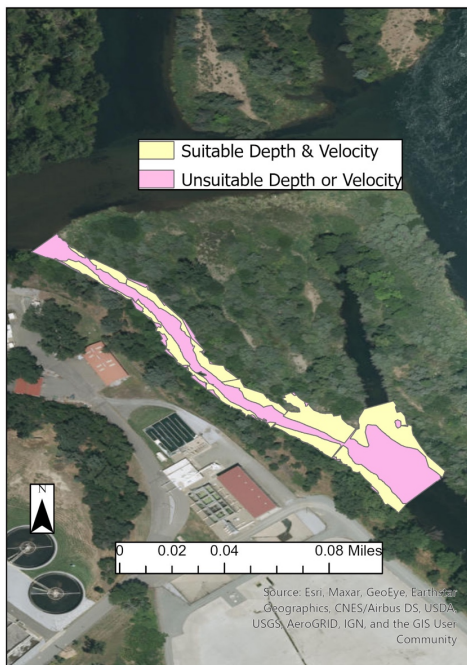
*Dates snorkeled: 4-12-21
*Keswick flow during snorkel: 5000 cfs

Clear Creek (Control)

3,500 CFS

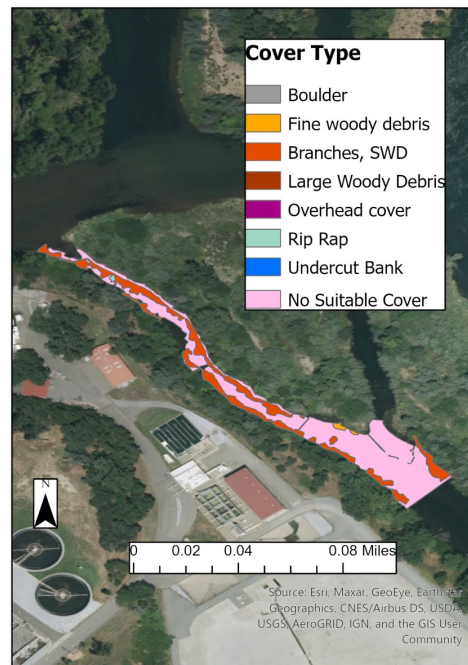
Control Site Habitat Mapping: Clear Creek Keswick Release 3,500 CFS

Depth & Velocity Mapping



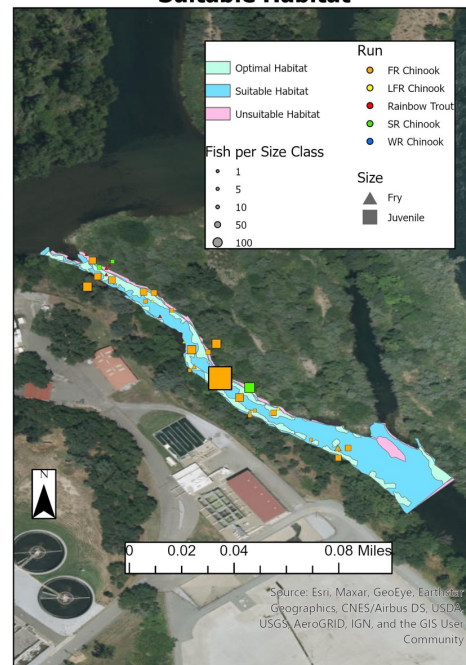
*Date mapped: 3-23-21

Cover from Predators



*Date mapped: 3-11-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



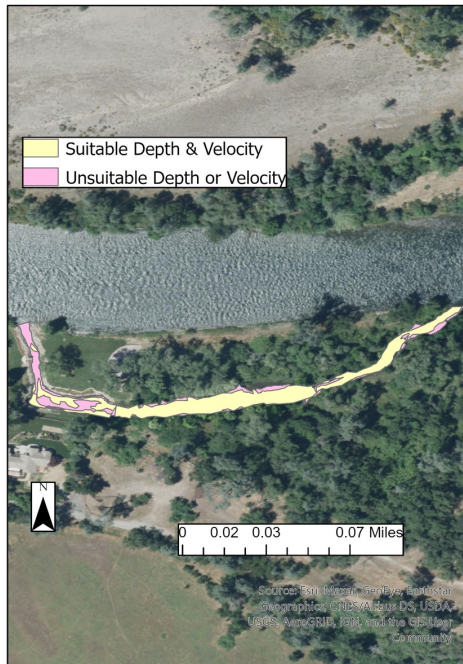
*Date snorkeled: 4-28-21, & 4-29-21
*Keswick flow during snorkel: 8000 cfs

Kapusta 1A (Impact)

3,250 CFS

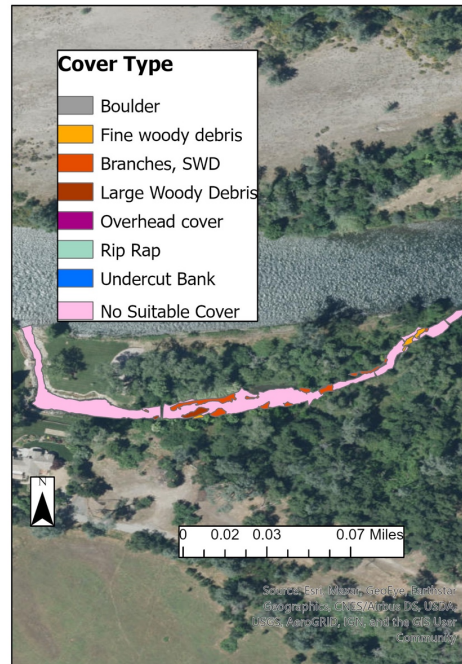
Post Restoration Habitat Mapping: Kapusta Keswick Release 3,250 CFS

Depth & Velocity Mapping



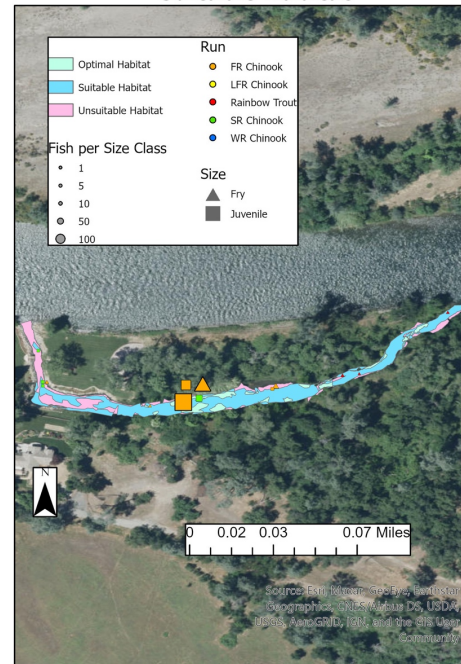
*Dates mapped: 2-11-21

Cover from Predators



*Dates mapped: 2-9-21, & 2-10-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



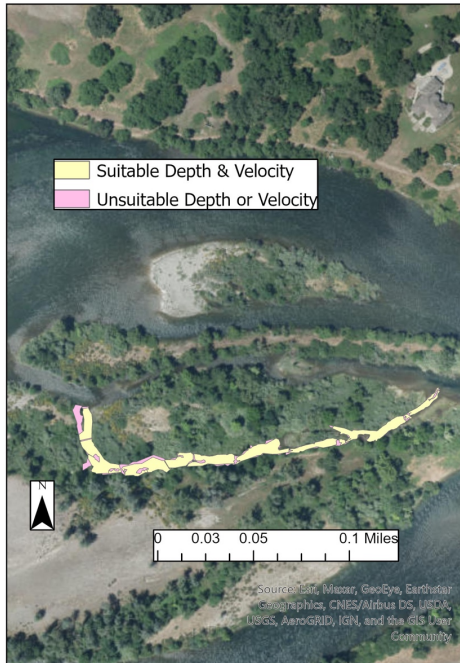
*Dates snorkeled: 3-25-21
*Keswick flow during snorkel: 3500 cfs

Kapusta Island (Impact)

3,500 CFS

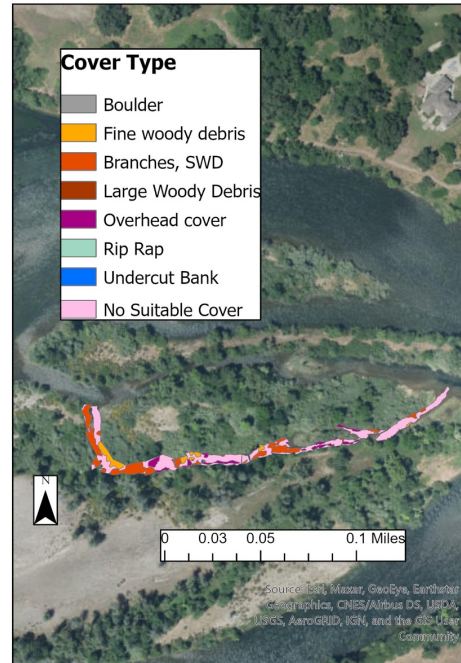
Pre Restoration Site Habitat Mapping: Kapusta Island Keswick Release 3,500 CFS

Depth & Velocity Mapping



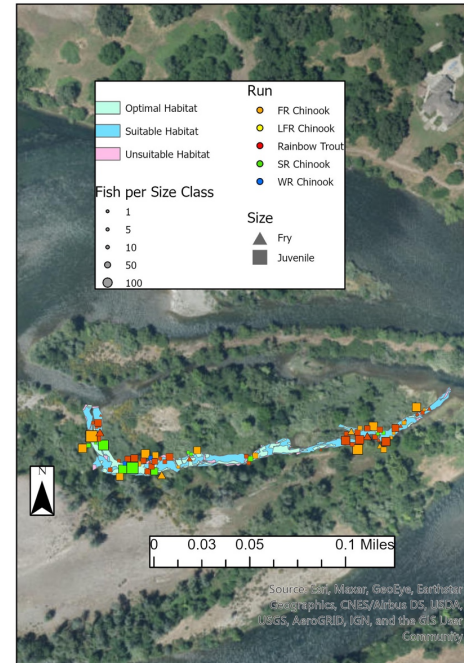
Dates mapped: 3-17-21 & 3-22-21

Cover from Predators



*Dates mapped: 3-15-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



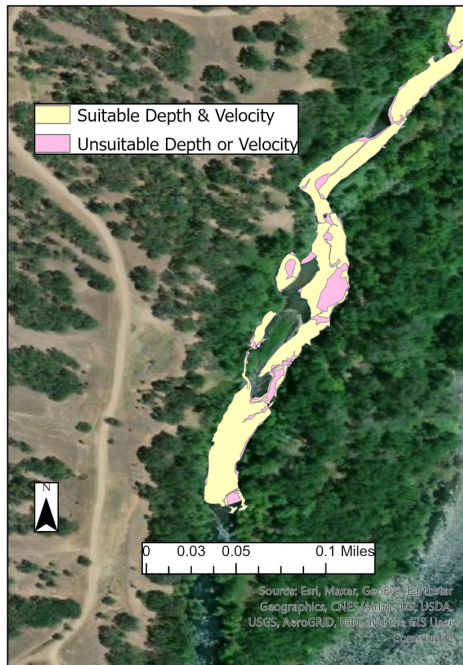
*Dates snorkeled: 4-8-21
*Keswick flow during snorkel: 5000 cfs

Lake California (Impact)

Lower - 3,250 CFS

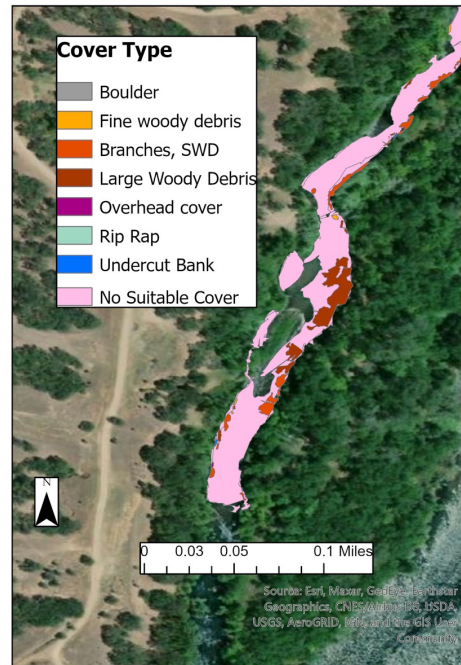
Post Restoration Habitat Mapping: Lake California (Lower) Keswick Release 3,250 CFS

Depth & Velocity Mapping



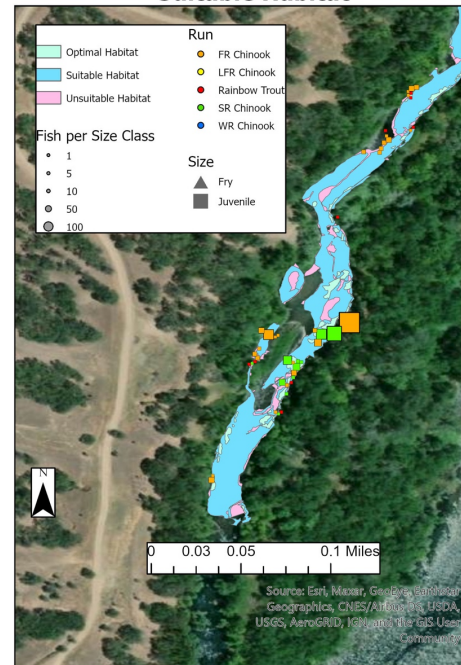
*Dates mapped: 1-5-21, 1-6-21, 1-7-21, 1-13-21, & 1-14-21

Cover from Predators



*Dates mapped: 1-7-21, & 1-13-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat

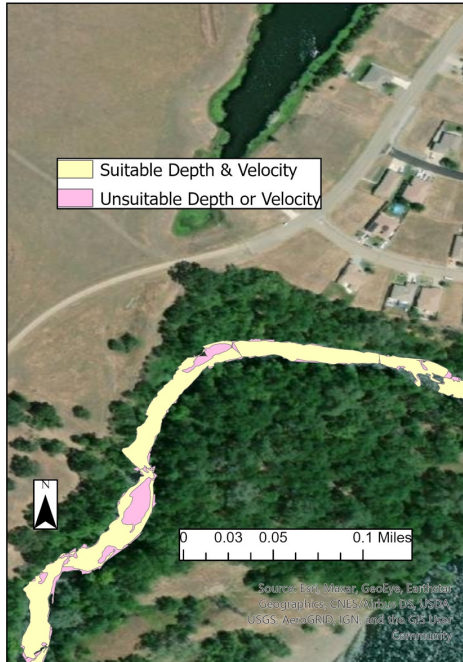


*Dates snorkeled: 4-21-21, 4-22-21, 4-27-21, 4-28-21
*Keswick flow during snorkel: 8000 cfs

Middle – 3,250 CFS

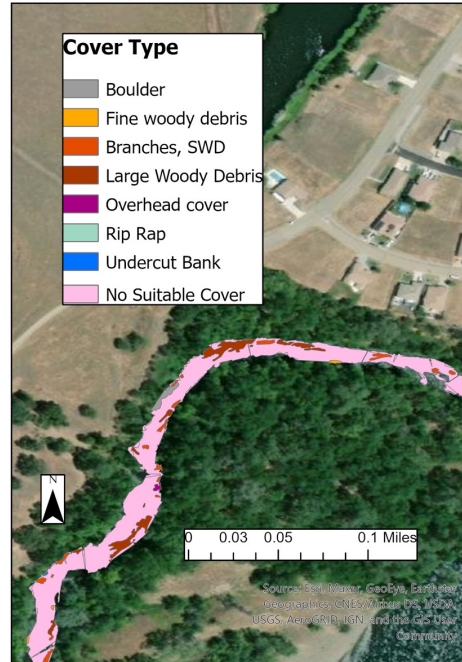
Post Restoration Habitat Mapping: Lake California (Middle) Keswick Release 3,250 CFS

Depth & Velocity Mapping



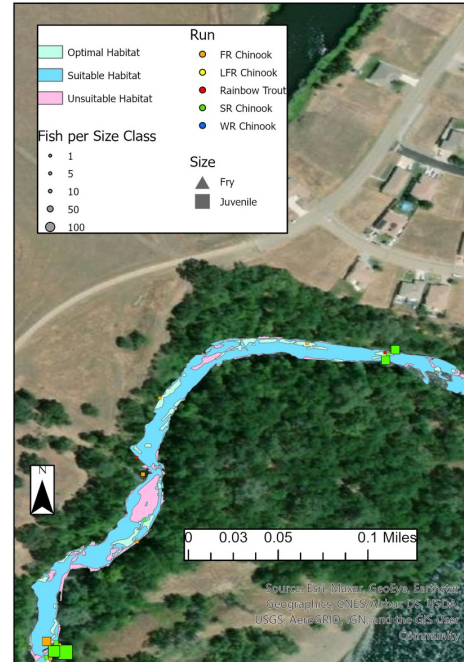
*Dates mapped: 1-5-21, 1-6-21, 1-7-21, 1-13-21, & 1-14-21

Cover from Predators



*Dates mapped: 1-7-21, & 1-13-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 4-21-21, 4-22-21, 4-27-21, 4-28-21
*Keswick flow during snorkel: 8000 cfs

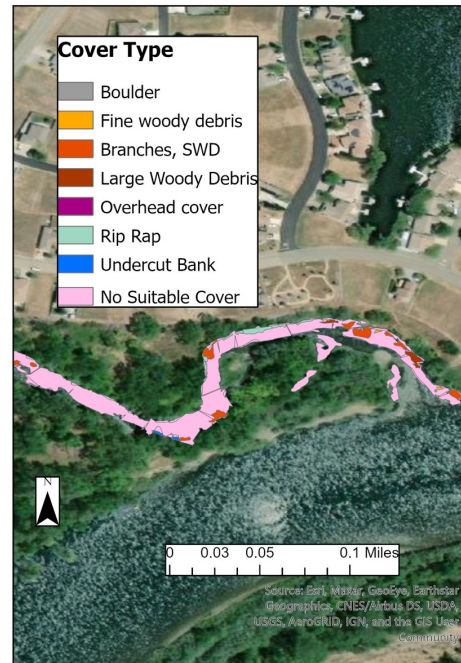
Post Restoration Habitat Mapping: Lake California (Upper) Keswick Release 3,250 CFS

Depth & Velocity Mapping



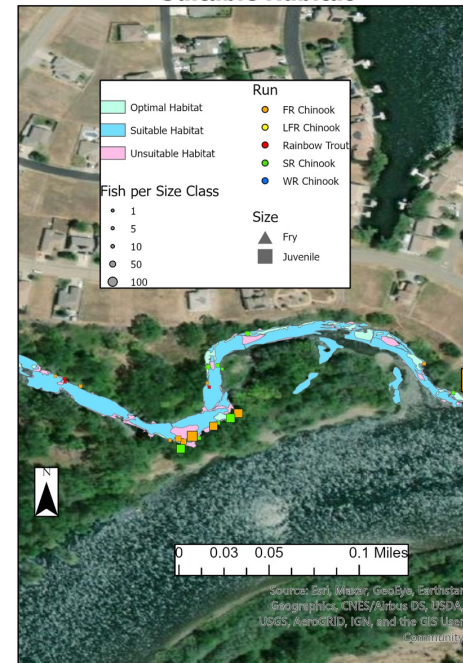
*Dates mapped: 1-5-21, 1-6-21, 1-7-21, 1-13-21, & 1-14-21

Cover from Predators



*Dates mapped: 1-7-21, & 1-13-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat

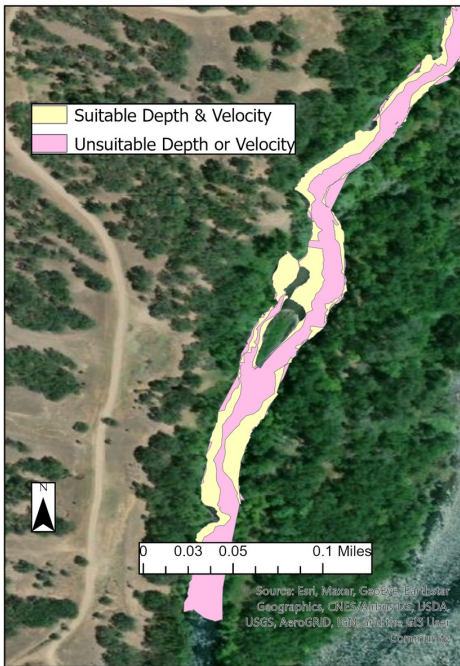


*Dates snorkeled: 4-21-21, 4-22-21, 4-27-21, 4-28-21
*Keswick flow during snorkel: 8000 cfs

Lower – 6,750 CFS

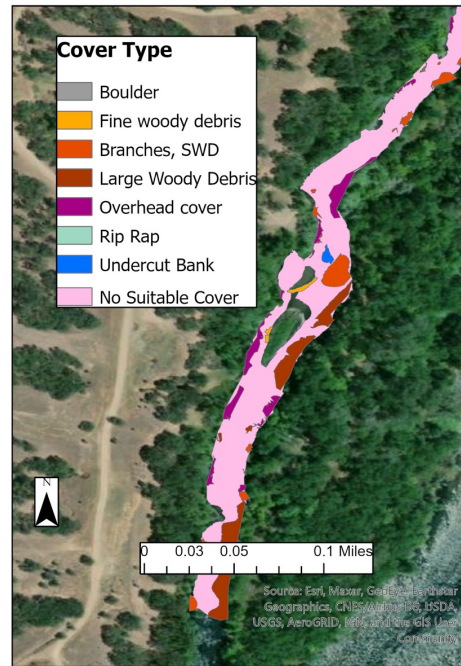
**Post Restoration Habitat Mapping: Lake California (Lower)
Keswick Release 6,700 CFS**

Depth & Velocity Mapping



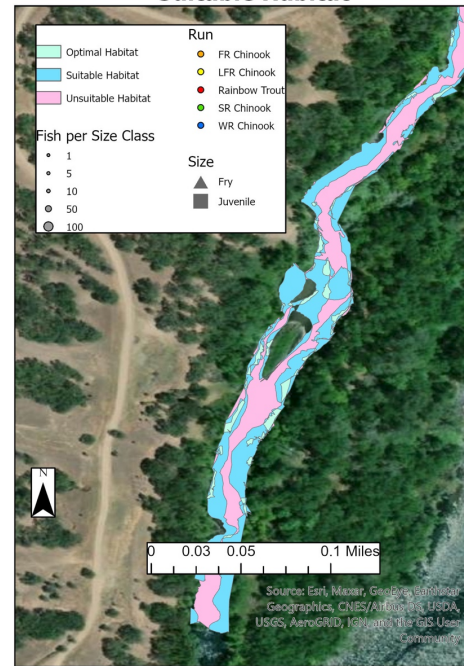
*Dates mapped: 9-21-20, 9-22-20, 9-23-20, 9-24-20, 9-28-20, & 10-13-20

Cover from Predators



*Dates mapped: 9-21-20, & 9-28-20
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat

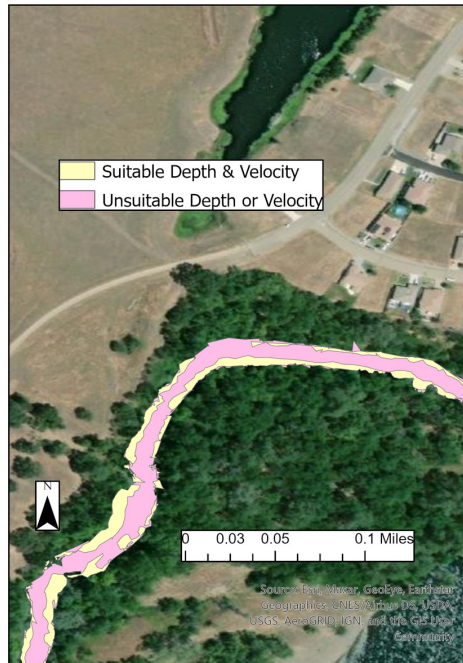


*Dates snorkeled: 11-18-20, & 11-24-20 (subsamped)
*Keswick flow during snorkel: 4400 cfs

Middle – 6,750 CFS

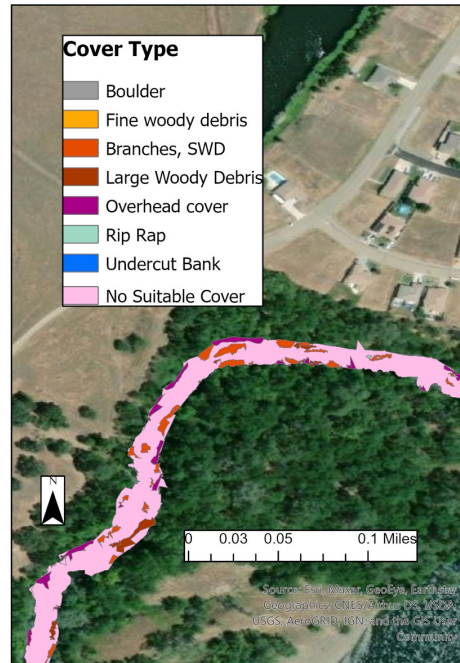
Post Restoration Habitat Mapping: Lake California (Middle) Keswick Release 6,700 CFS

Depth & Velocity Mapping



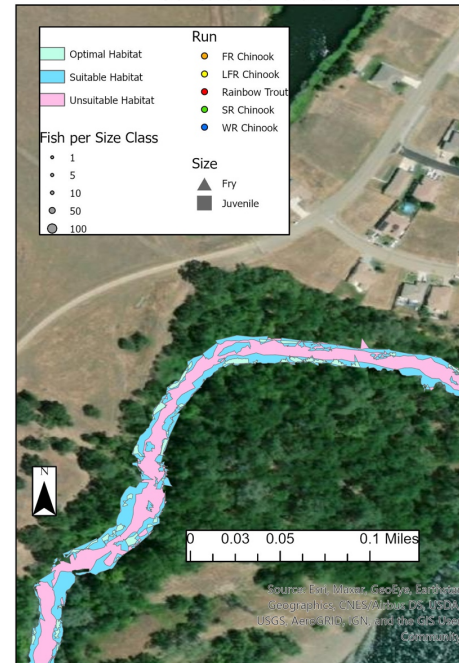
*Dates mapped: 9-21-20, 9-22-20, 9-23-20, 9-24-20, 9-28-20, & 10-13-20

Cover from Predators



*Dates mapped: 9-21-20, & 9-28-20
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 11-18-20, & 11-24-20 (subsamped)
*Keswick flow during snorkel: 4400 cfs

Upper – 6750 CFS

Post Restoration Habitat Mapping: Lake California (Upper) Keswick Release 6,700 CFS

Depth & Velocity Mapping



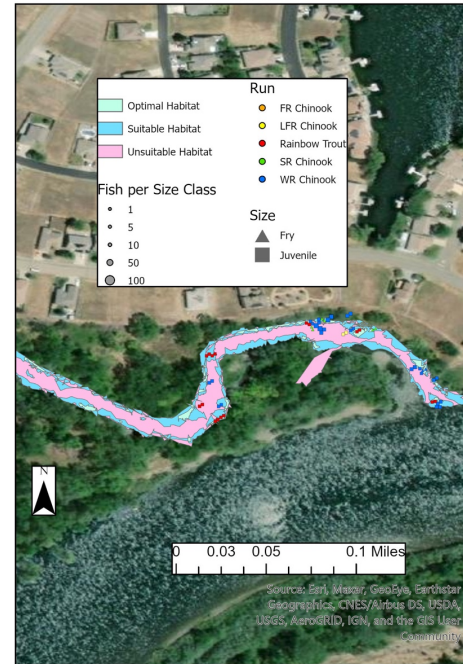
*Dates mapped: 9-21-20, 9-22-20, 9-23-20, 9-24-20, 9-28-20, & 10-13-20

Cover from Predators



*Dates mapped: 9-21-20, & 9-28-20
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



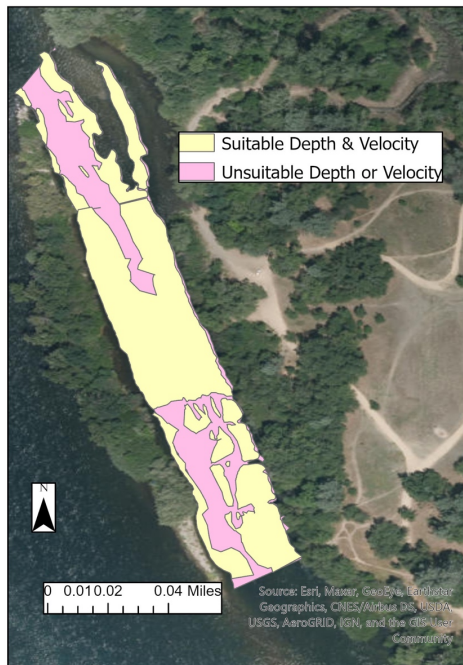
*Dates snorkeled: 11-18-20, & 11-24-20 (subsamped)
*Keswick flow during snorkel: 4400 cfs

Painter's Riffle (Impact)

3,250 CFS

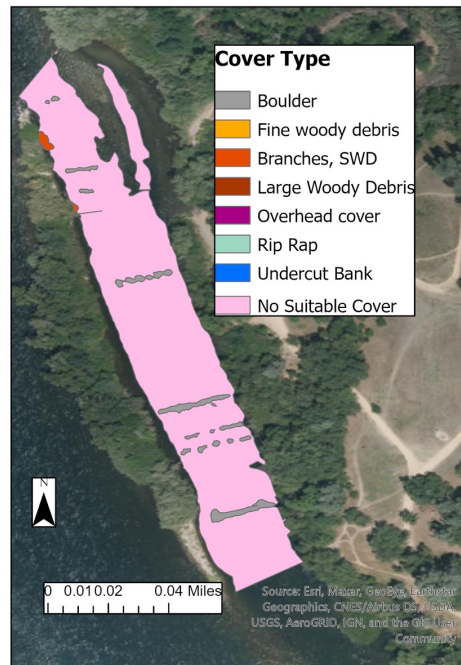
Post Restoration Habitat Mapping: Painters Keswick Release 3,250 CFS

Depth & Velocity Mapping



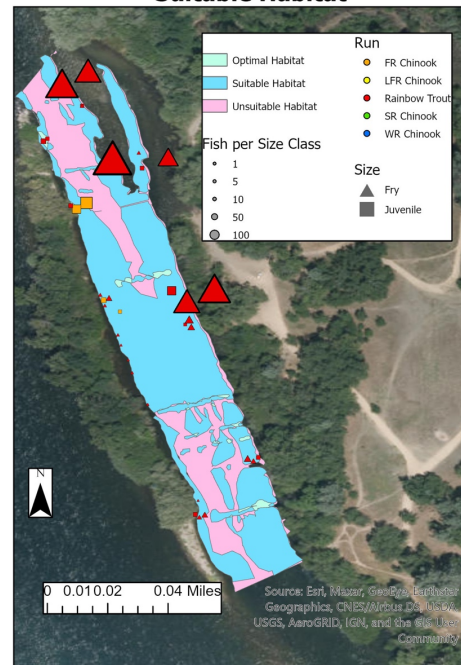
*Dates mapped: 2-23-21

Cover from Predators



*Dates mapped: 2-24-21, & 3-1-21

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 4-7-21

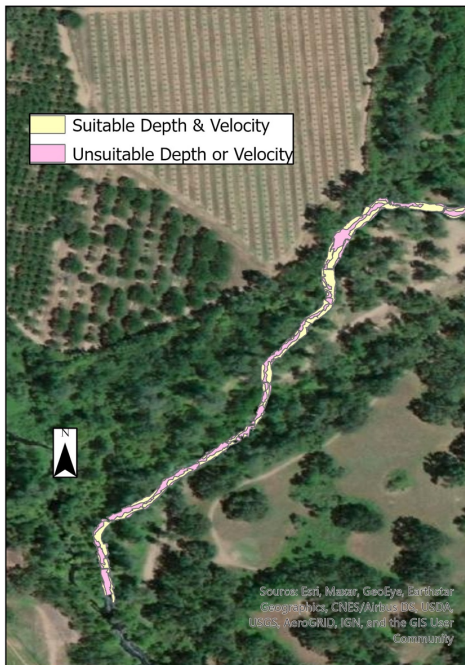
*Keswick flow during snorkel: 4700 cfs

Reading Island (Impact)

Lower – 3,100 CFS

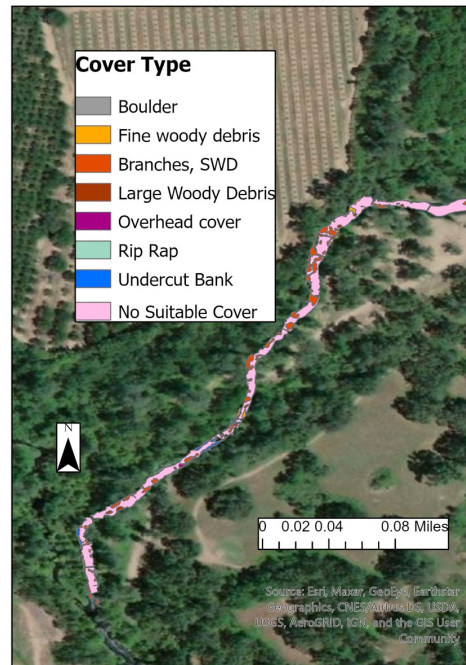
Post Restoration Habitat Mapping: Reading Island (Lower) Keswick Release 3,100 CFS

Depth & Velocity Mapping



*Dates mapped: 1-19-21, 1-21-21, 1-25-21

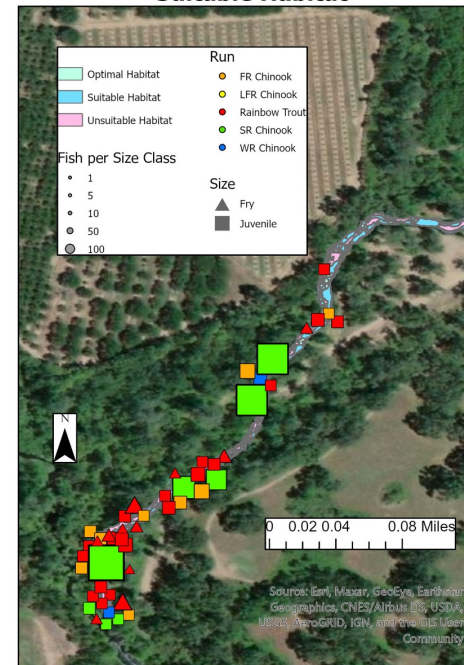
Cover from Predators



*Dates mapped: 1-21-21, 1-26-21, & 1-27-21

*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



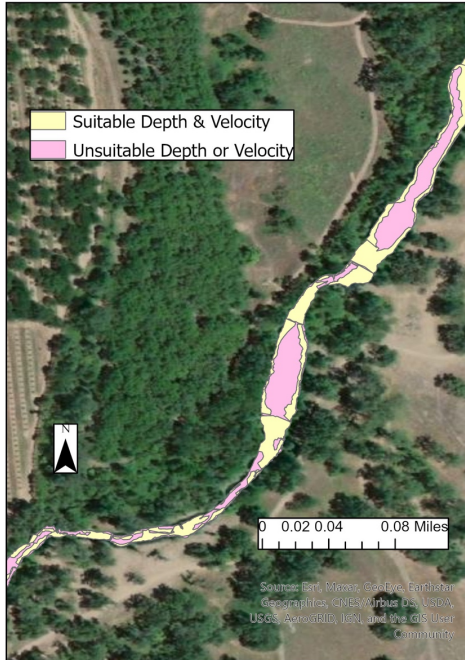
*Dates snorkeled: 4-5-21

*Keswick flow during snorkel: 4500 cfs

Middle – 3,100 CFS

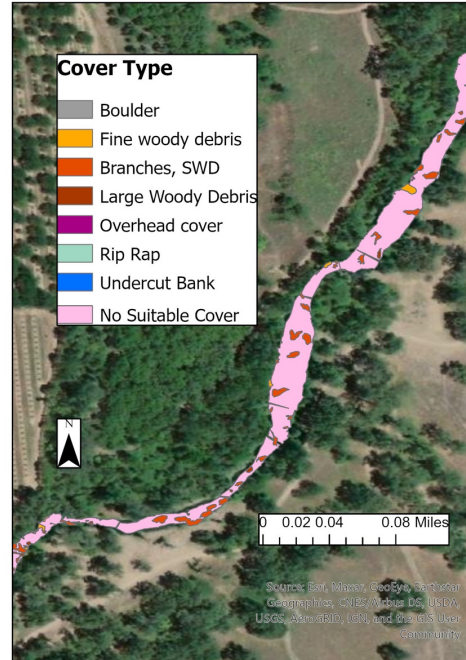
Post Restoration Habitat Mapping: Reading Island (Middle) Keswick Release 3,100 CFS

Depth & Velocity Mapping



*Dates mapped: 1-19-21, 1-21-21, 1-25-21

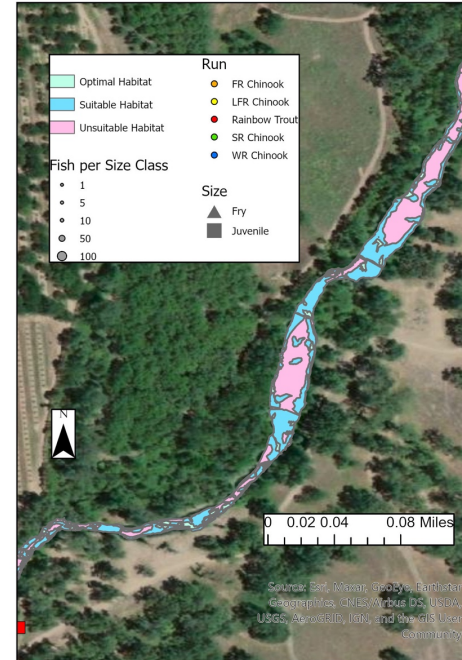
Cover from Predators



*Dates mapped: 1-21-21, 1-26-21, & 1-27-21

*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



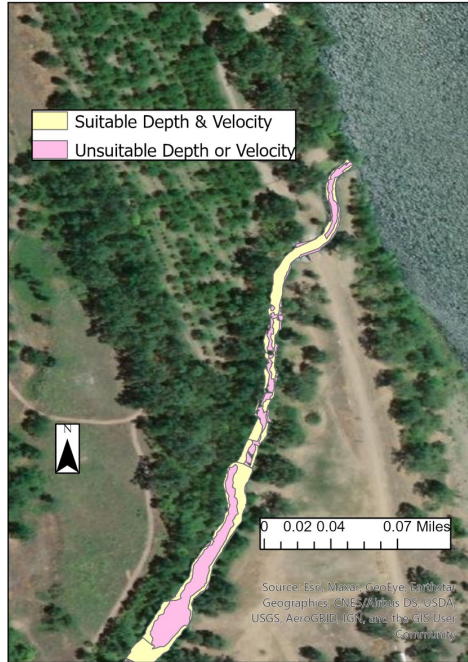
*Dates snorkeled: 4-5-21

*Keswick flow during snorkel: 4500 cfs

Upper – 3,100 CFS

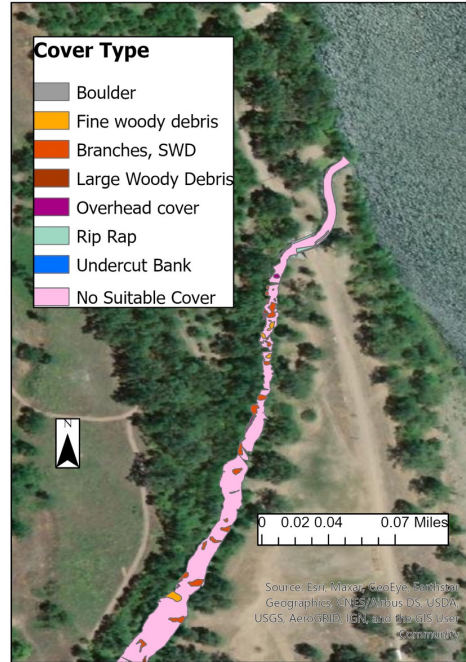
Post Restoration Habitat Mapping: Reading Island (Upper) Keswick Release 3,100 CFS

Depth & Velocity Mapping



*Dates mapped: 1-19-21, 1-21-21, 1-25-21

Cover from Predators



*Dates mapped: 1-21-21, 1-26-21, & 1-27-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 4-5-21
*Keswick flow during snorkel: 4500 cfs

Rio Vista (Impact)

Lower – 3,250 CFS

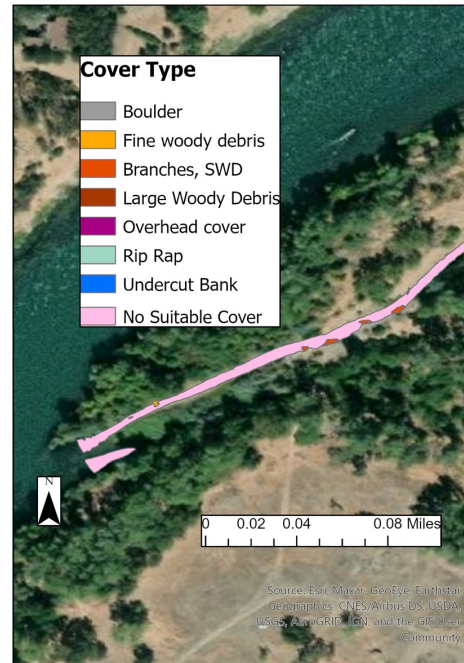
Post Restoration Habitat Mapping: Rio Vista (Lower) Keswick Release 3,250 CFS

Depth & Velocity Mapping



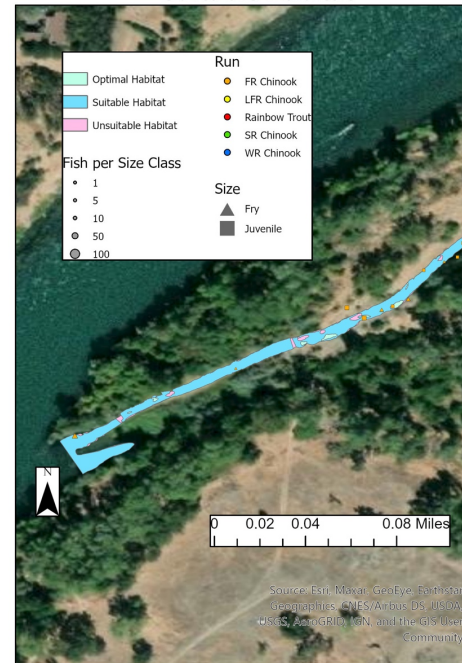
*Dates mapped: 12-31-20, & 1-4-21

Cover from Predators



*Dates mapped: 12-31-20, & 1-4-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 3-23-21
*Keswick flow during snorkel: 3500 cfs

Middle – 3,250 CFS

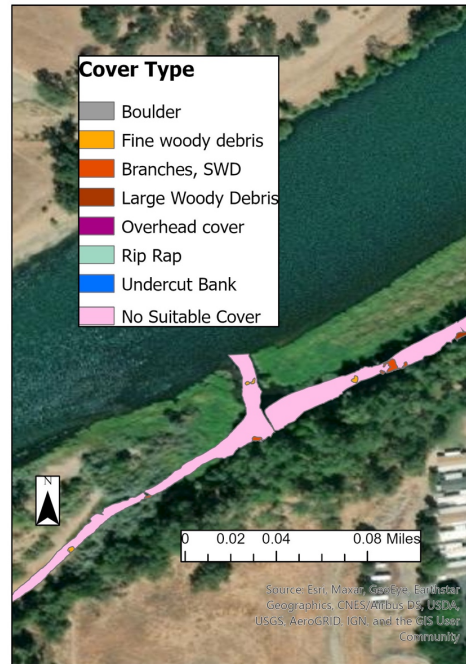
Pre Restoration Habitat Mapping: Rio Vista (Middle) Keswick Release 3,250 CFS

Depth & Velocity Mapping



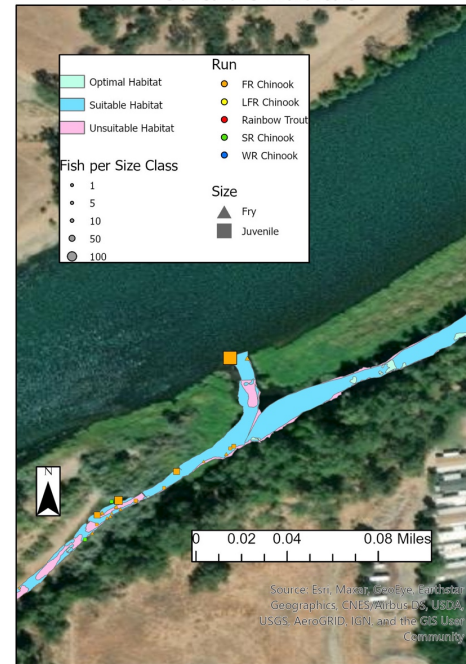
*Dates mapped: 12-31-20, & 1-4-21

Cover from Predators



*Dates mapped: 12-31-20, & 1-4-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat

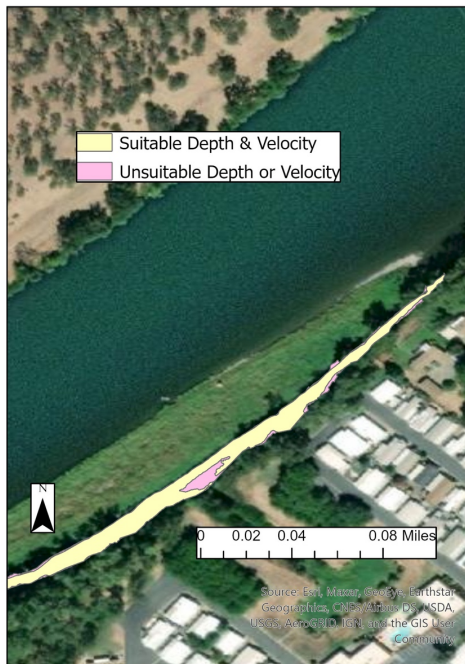


*Dates snorkeled: 3-23-21
*Keswick flow during snorkel: 3500 cfs

Upper – 3,250 CFS

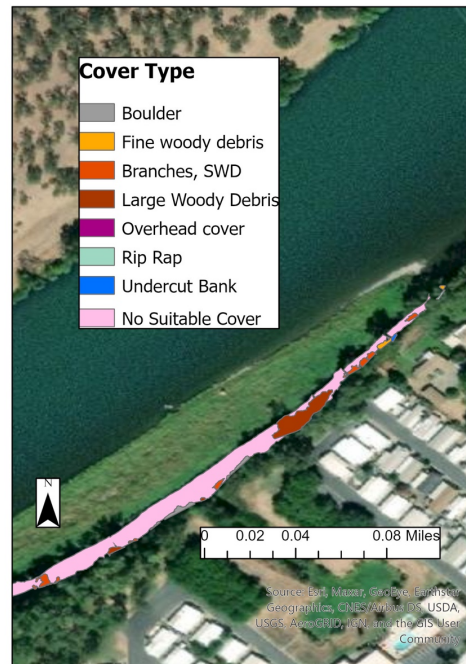
Pre Restoration Habitat Mapping: Rio Vista (Upper) Keswick Release 3,250 CFS

Depth & Velocity Mapping



*Dates mapped: 12-31-20, & 1-4-21

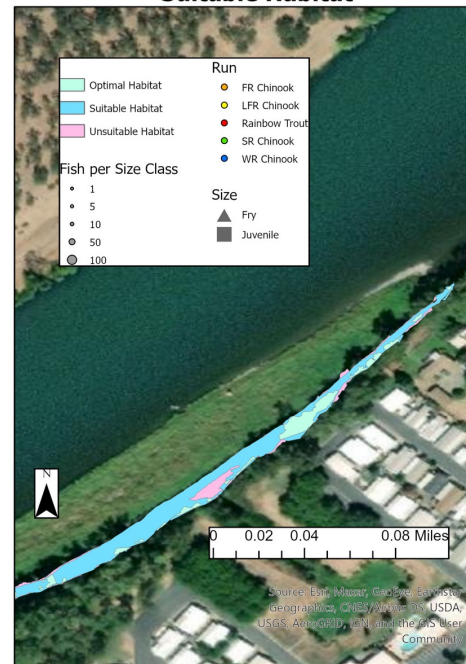
Cover from Predators



*Dates mapped: 12-31-20, & 1-4-21

*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 3-23-21

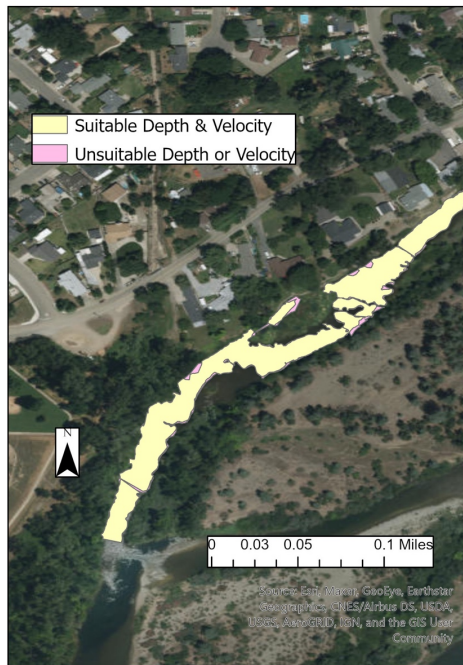
*Keswick flow during snorkel: 3500 cfs

Shea Island (Impact)

Lower – 3,250 CFS

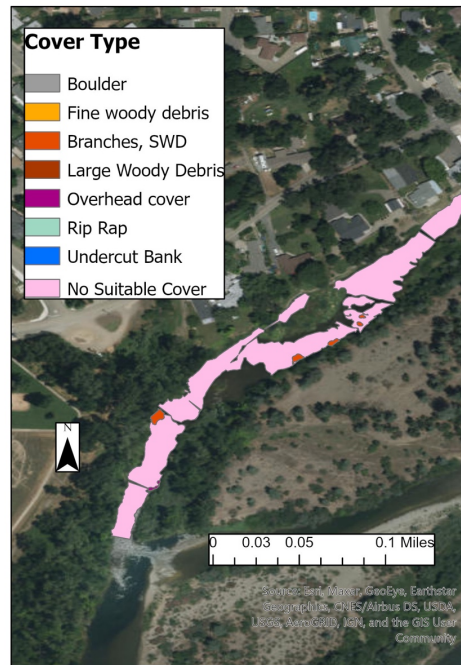
Pre Restoration Habitat Mapping: Shae Island (Lower) Keswick Release 3,250 CFS

Depth & Velocity Mapping



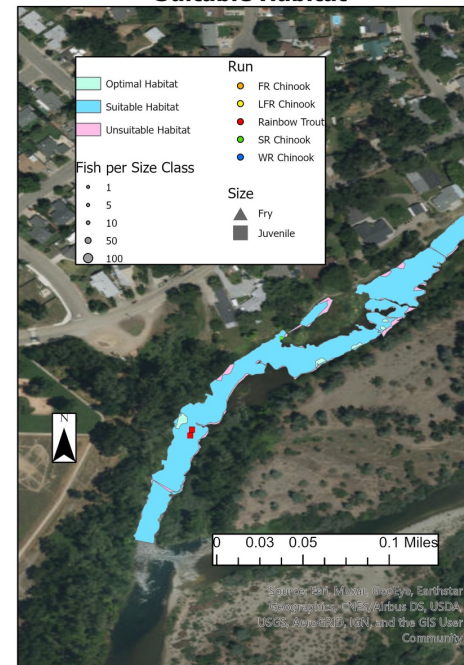
*Dates mapped: 2-16-21

Cover from Predators



*Dates mapped: 2-10-21 & 2-16-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat

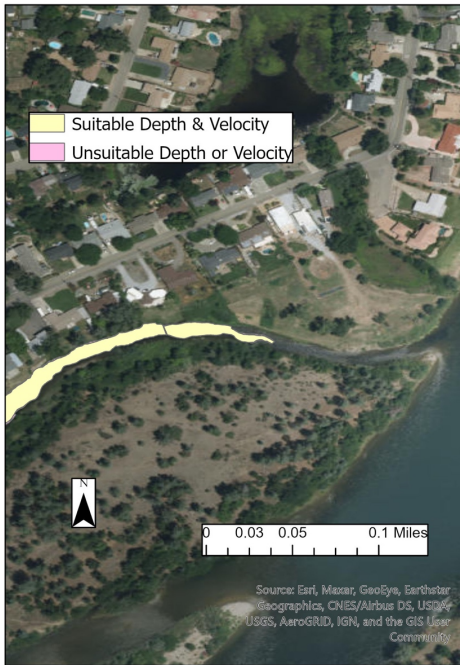


*Dates snorkeled: 4-5-21
*Keswick flow during snorkel: 4500 cfs

Upper – 3,250 CFS

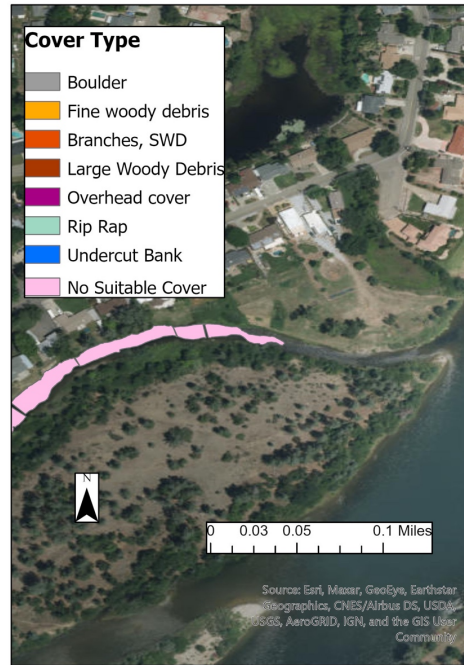
Pre Restoration Habitat Mapping: Shae Island (Upper) Keswick Release 3,250 CFS

Depth & Velocity Mapping



*Dates mapped: 2-16-21

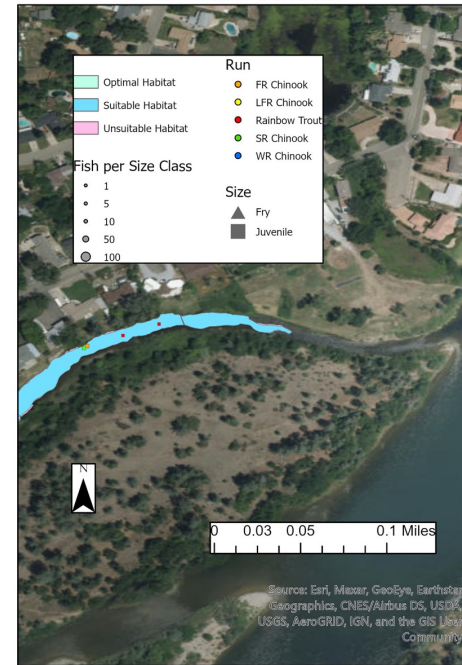
Cover from Predators



*Dates mapped: 2-10-21 & 2-16-21

*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 4-5-21

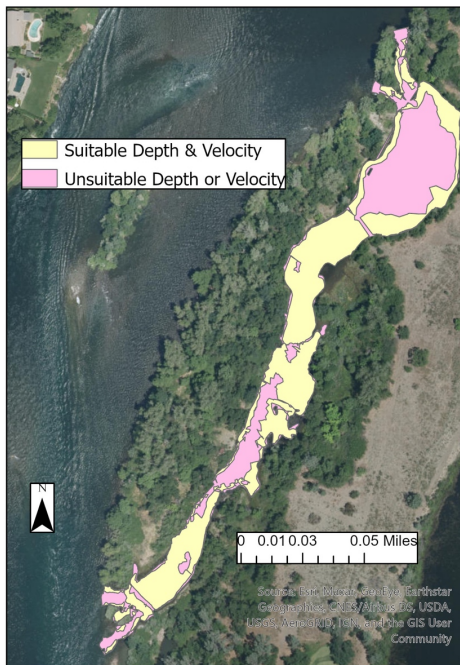
*Keswick flow during snorkel: 4500 cfs

Wyndham (Impact)

3,400 CFS

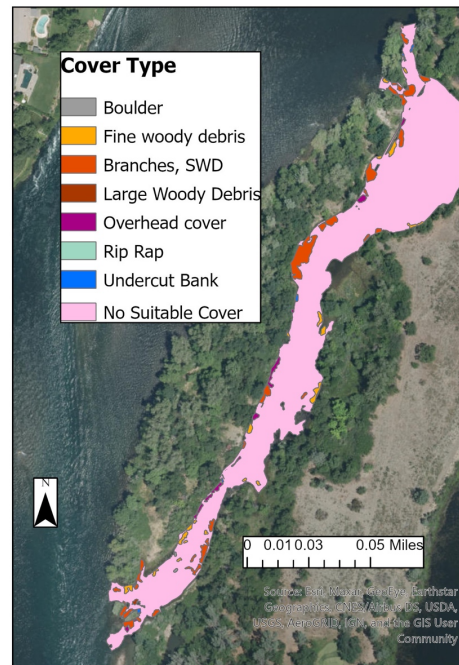
Control Site Habitat Mapping: Wyndham Keswick Release 3,400 CFS

Depth & Velocity Mapping



*Dates mapped: 3-3-21, & 3-4-21

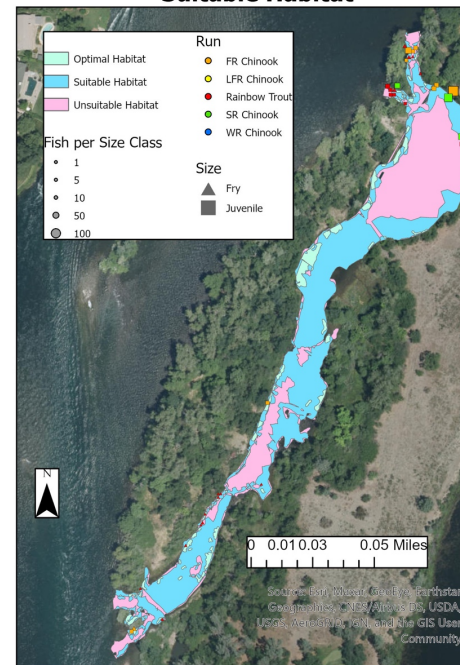
Cover from Predators



*Dates mapped: 3-3-21, 3-4-21, & 3-9-21

*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 3-30-21, & 3-31-21

*Keswick flow during snorkel: 3500 cfs

APPENDIX E: HABITAT MAPS (NO COBBLE)

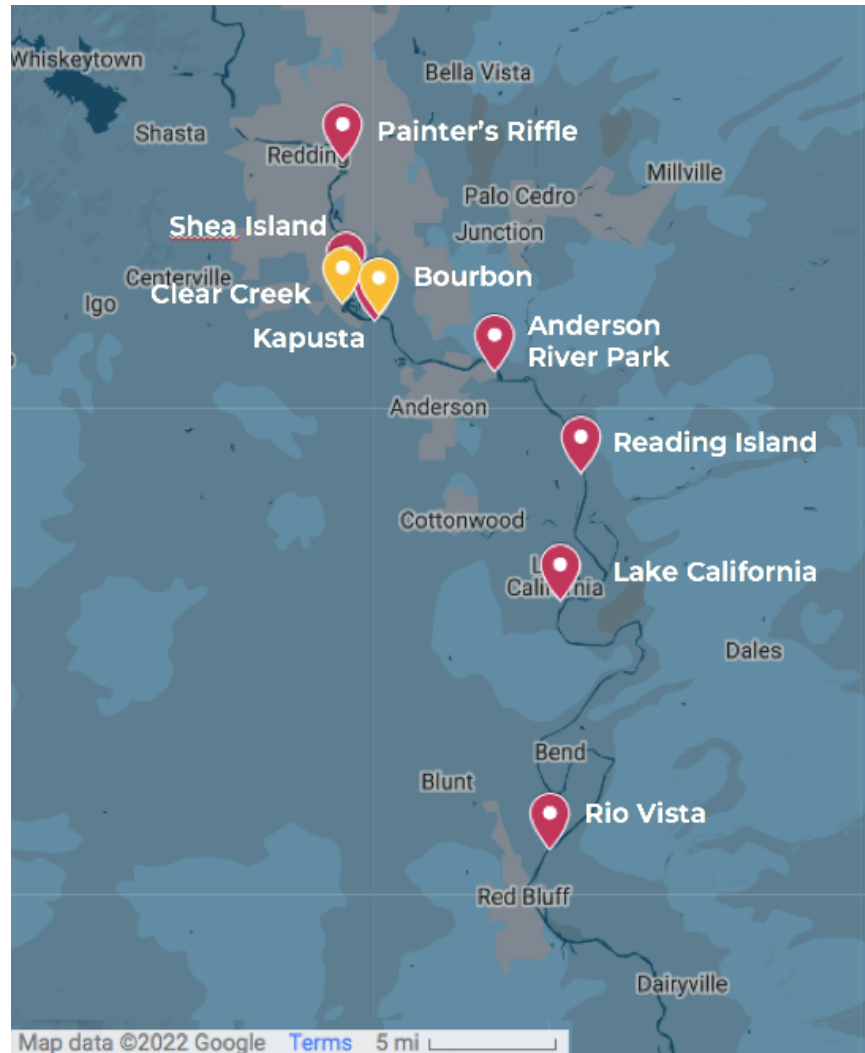
Note: Due to file size limitations, this appendix only contains maps from this reporting period. Additional maps can be found in the appendix of the 2019-20 Annual Report.

Table of Mapped Sites

Site Description	Flow (CFS)
Anderson River Park (Impact)	
<i>Pre-restoration Phase 2 (Lower)</i>	7,000
<i>Pre-restoration Phase 3 (Lower)</i>	7,000
<i>Post-restoration Phase 2 (Lower)</i>	3,250
<i>Post-restoration Phase 2 (Upper)</i>	3,250
<i>Post-restoration Phase 3 (Lower)</i>	3,250
Bourbon Island (Control)	3,500
Clear Creak (Control)	3,500
Kapusta 1A (Impact)	3,250
Kapusta Island (Impact)	3,500
Lake California (Impact)	
<i>Lower</i>	3,250 and 6,750
<i>Middle</i>	3,250 and 6,750
<i>Upper</i>	3,250 and 6,750
Painter's Riffle (Impact)	3,250
Reading Island (Impact)	
<i>Lower</i>	3,250
<i>Middle</i>	3,250
<i>Upper</i>	3,250
Rio Vista (Impact)	
<i>Lower</i>	3,250
<i>Middle</i>	3,250
<i>Upper</i>	3,250
Shea Island (Impact)	
<i>Lower</i>	3,250
<i>Upper</i>	3,250

Location of mapped sites

Red locations are project sites. Orange locations are control sites.



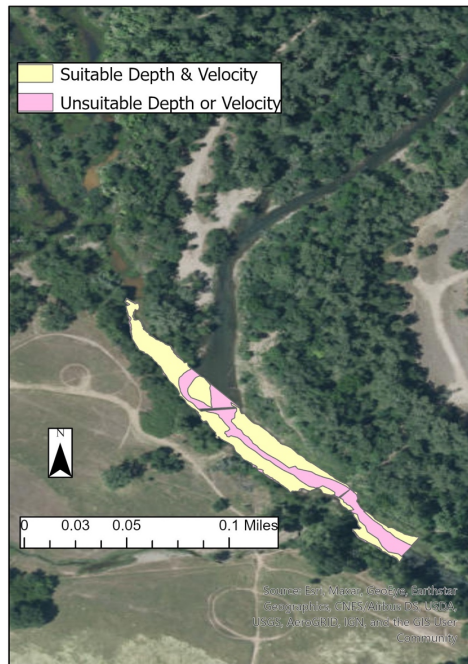
Anderson River Park (Baseline & Impact)

Pre-Restoration

Phase 2 (Lower) – 7,000 CFS

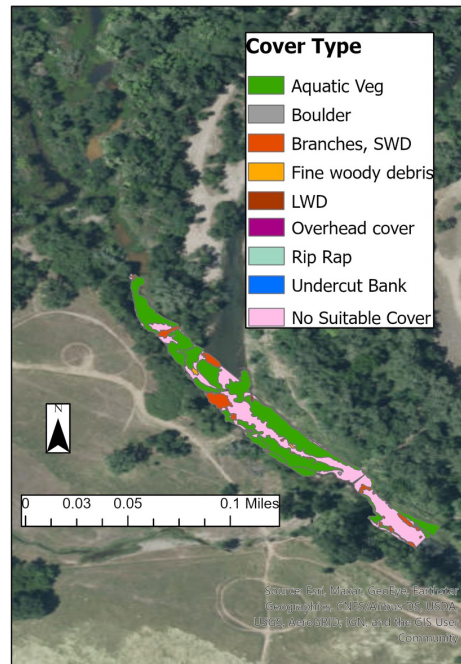
**Pre Restoration Habitat Mapping: Anderson River Park Phase 2 (Lower)
Keswick Release 7,000 CFS**

Depth & Velocity Mapping



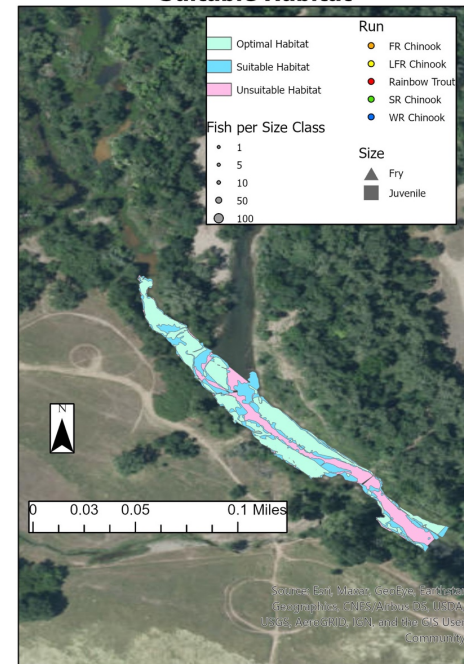
*Dates mapped: 10-2-20

Cover from Predators



*Dates mapped: 10-5-20

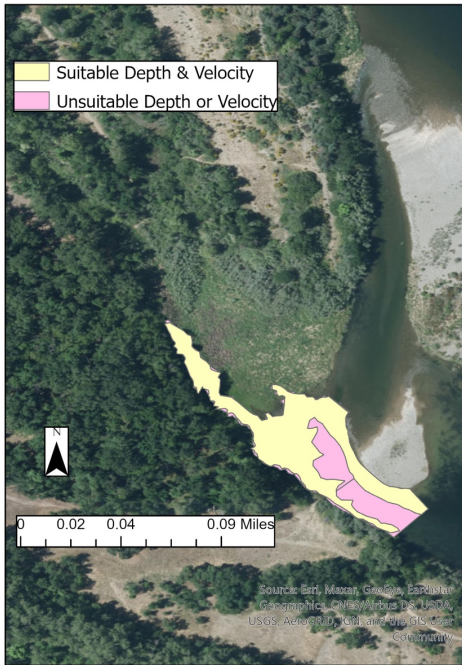
Fish Locations Among Optimal & Suitable Habitat



Phase 3 (Lower) – 7,000 CFS

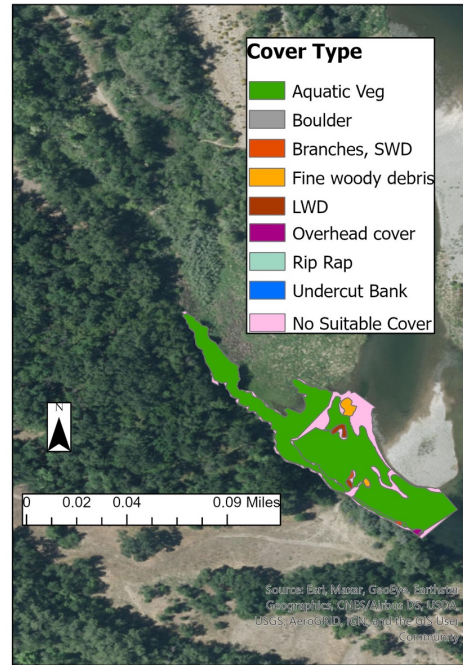
Pre Restoration Habitat Mapping: Anderson River Park Phase 3 (Lower) Keswick Release 7,000 CFS

Depth & Velocity Mapping



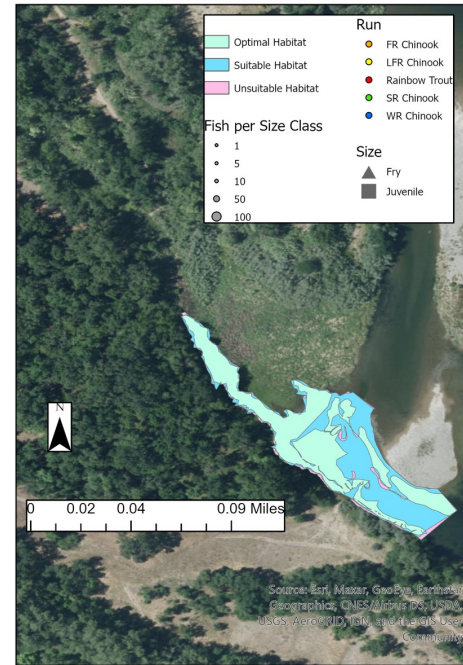
*Dates mapped: 10-6-20

Cover from Predators



*Dates mapped: 10-7-20

Fish Locations Among Optimal & Suitable Habitat

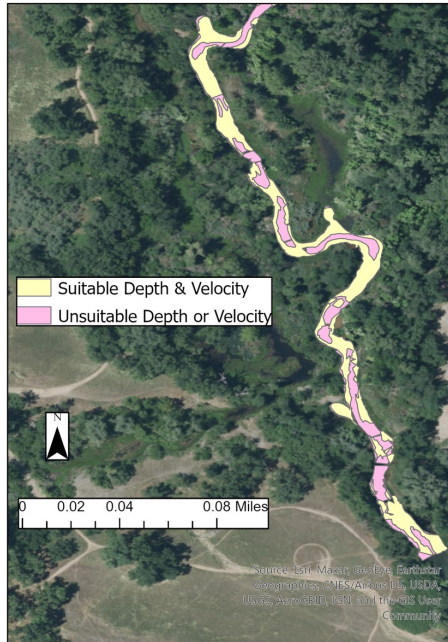


Post-Restoration

Phase 2 (Lower) – 3,250 CFS

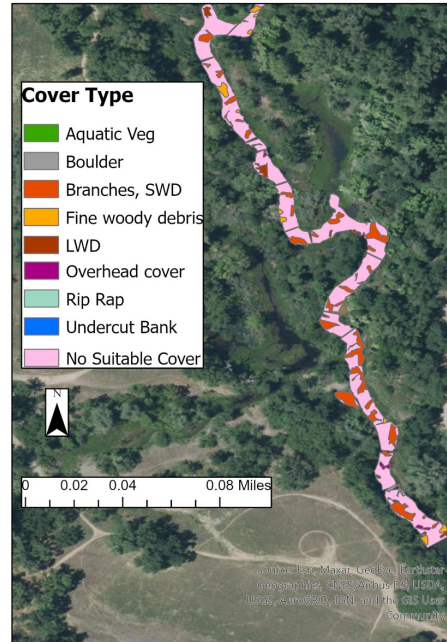
**Post Restoration Habitat Mapping: Anderson River Park Phase 2 (Lower)
Keswick Release 3,250 CFS**

Depth & Velocity Mapping



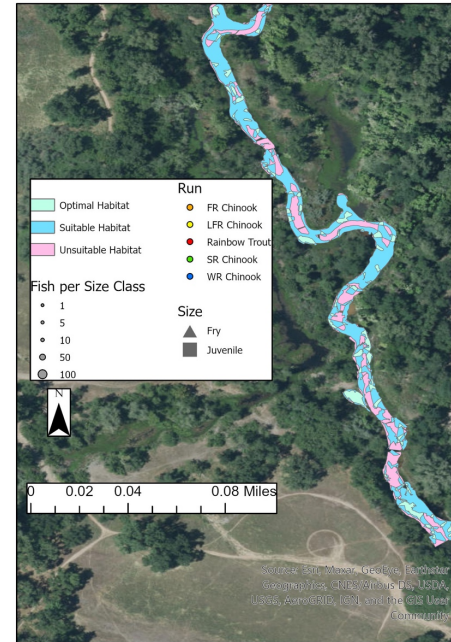
*Dates mapped: 2-9-21 & 2-11-21

Cover from Predators



*Dates mapped: 2-4-21

Fish Locations Among Optimal & Suitable Habitat



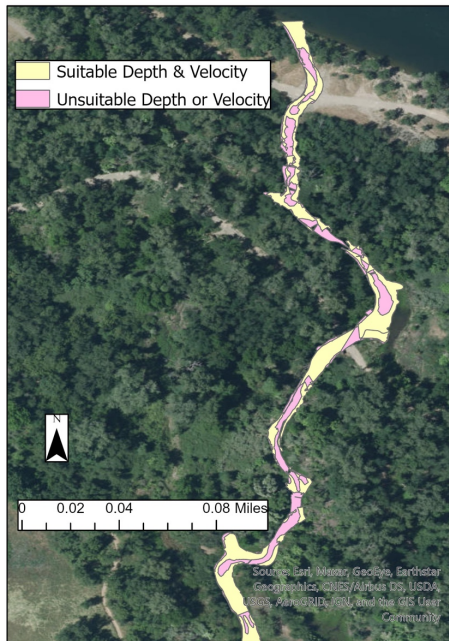
*Dates snorkeled: 3-24-21

*Keswick flow during snorkel: 3500 cfs

Phase 2 (Upper) – 3,250 CFS

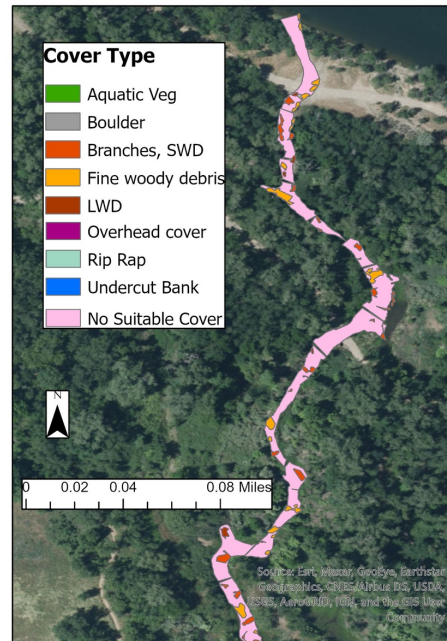
Post Restoration Habitat Mapping: Anderson River Park Phase 2 (Upper) Keswick Release 3,250 CFS

Depth & Velocity Mapping



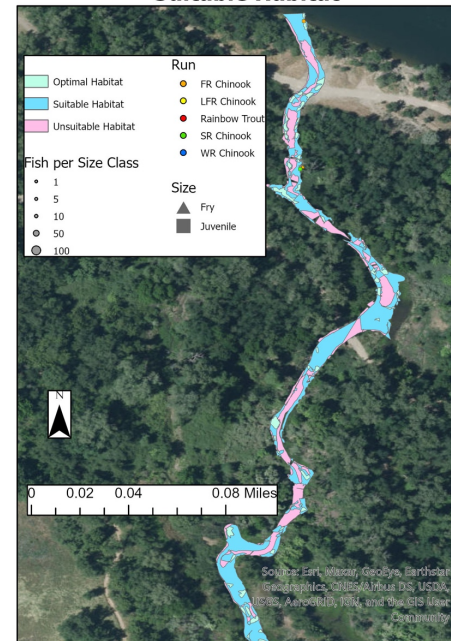
*Dates mapped: 2-9-21 & 2-11-21

Cover from Predators



*Dates mapped: 2-4-21

Fish Locations Among Optimal & Suitable Habitat



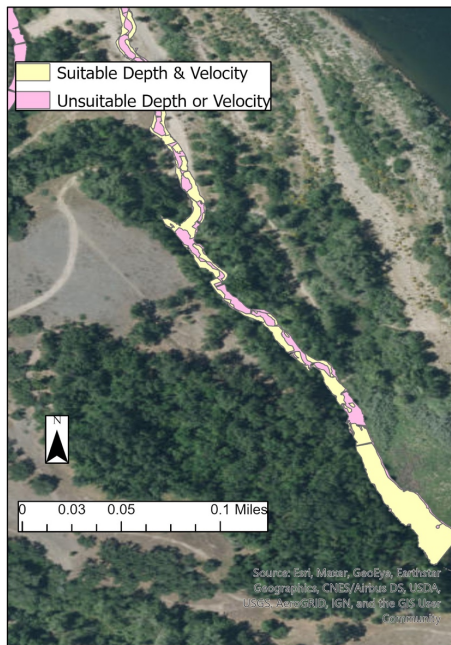
*Dates snorkeled: 3-24-21

*Keswick flow during snorkel: 3500 cfs

Phase 3 (Lower) – 3,250 CFS

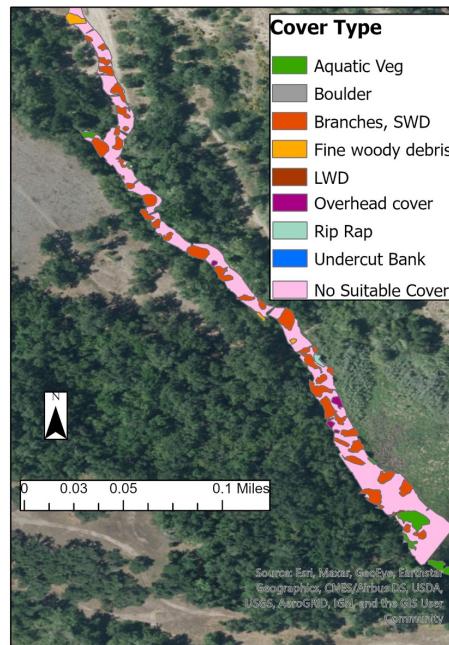
Post Restoration Habitat Mapping: Anderson River Park Phase 3 (Lower) Keswick Release 3,250 CFS

Depth & Velocity Mapping



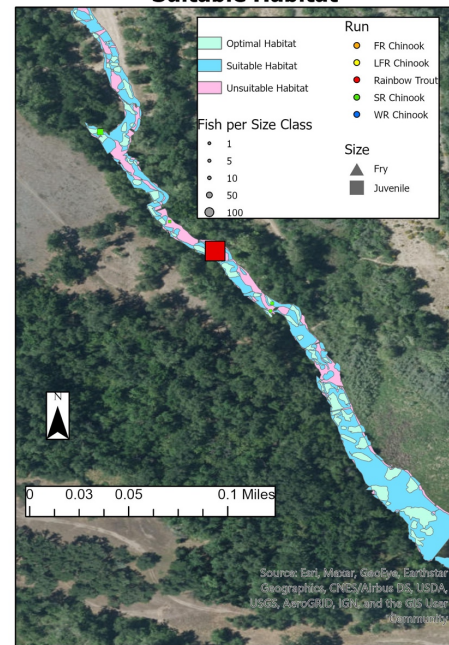
*Dates mapped: 1-28-21, 2-3-21, & 2-4-21

Cover from Predators



*Dates mapped: 2-8-21

Fish Locations Among Optimal & Suitable Habitat



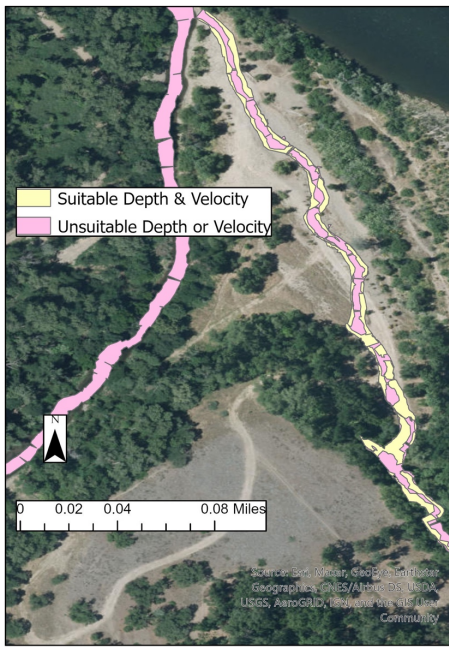
*Dates snorkeled: 3-25-21

*Keswick flow during snorkel: 3500 cfs

Phase 3 (Upper) – 3,250 CFS

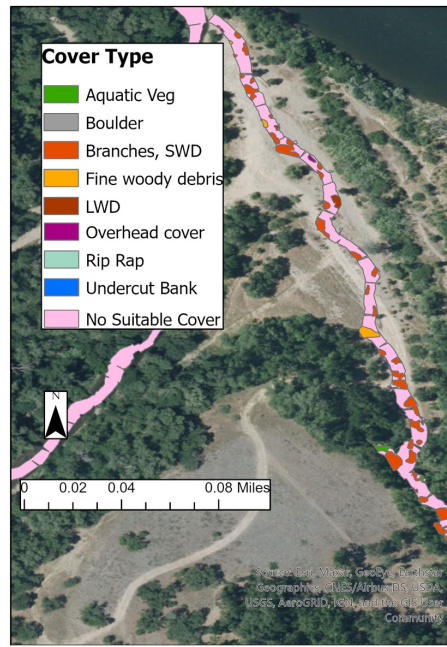
Post Restoration Habitat Mapping: Anderson River Park Phase 3 (Upper) Keswick Release 3,250 CFS

Depth & Velocity Mapping



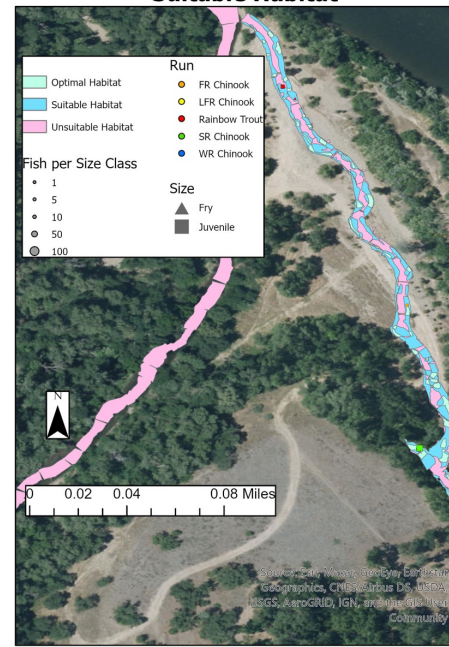
*Dates mapped: 1-28-21, 2-3-21, & 2-4-21

Cover from Predators



*Dates mapped: 2-8-21

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 3-25-21

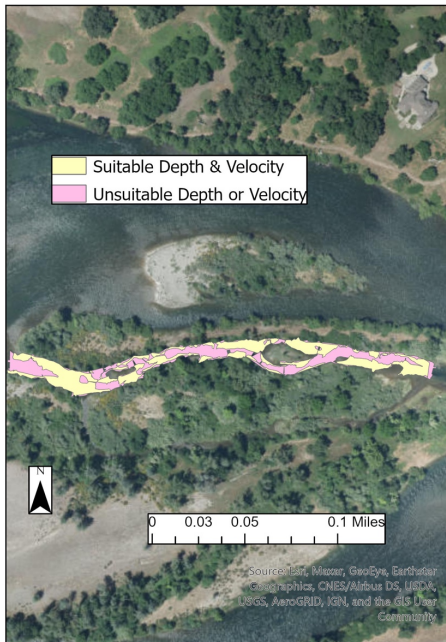
*Keswick flow during snorkel: 3500 cfs

Bourbon Island (Control)

3,500 CFS

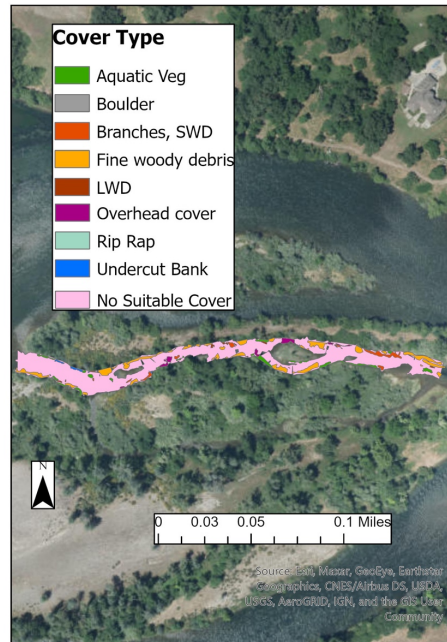
Control Site Habitat Mapping: Bourbon Keswick Release 3,500 CFS

Depth & Velocity Mapping



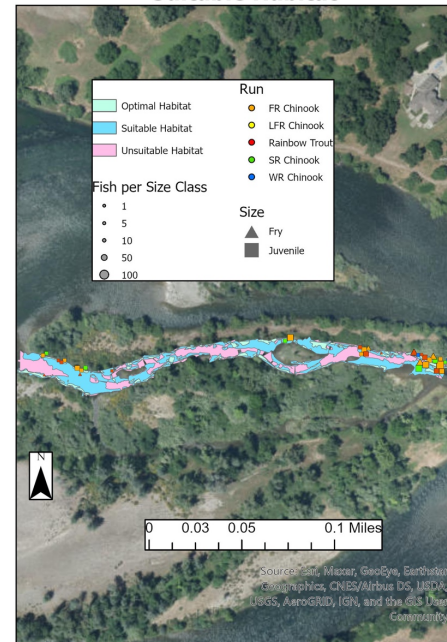
Dates mapped: 3-16-21 & 3-17-21

Cover from Predators



*Dates mapped: 3-15-21
*Vegetation not included

Fish Locations Among Optimal & Suitable Habitat



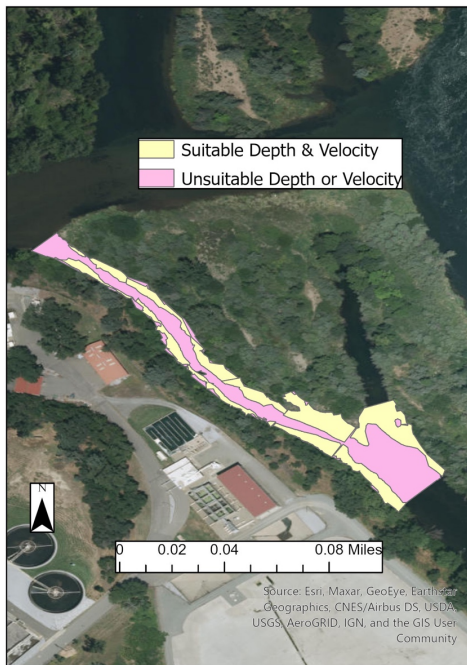
*Dates snorkeled: 4-12-21
*Keswick flow during snorkel: 5000 cfs

Clear Creek (Control)

3,500 CFS

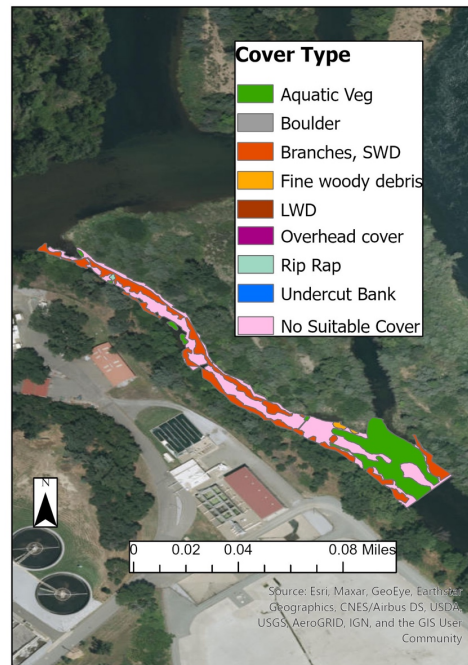
Control Site Habitat Mapping: Clear Creek Keswick Release 3,500 CFS

Depth & Velocity Mapping



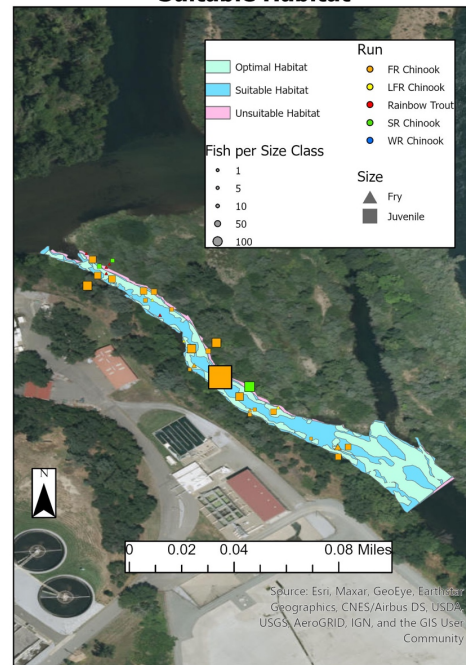
*Date mapped: 3-23-21

Cover from Predators



*Date mapped: 3-11-21

Fish Locations Among Optimal & Suitable Habitat



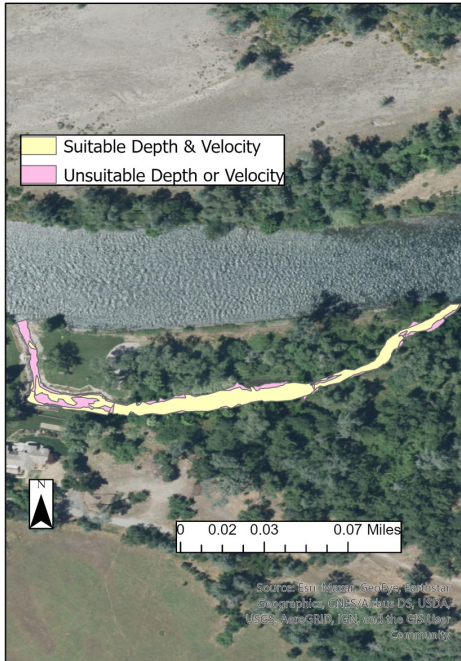
*Date snorkeled: 4-28-21, & 4-29-21
*Keswick flow during snorkel: 8000 cfs

Kapusta (Impact)

3,250 CFS

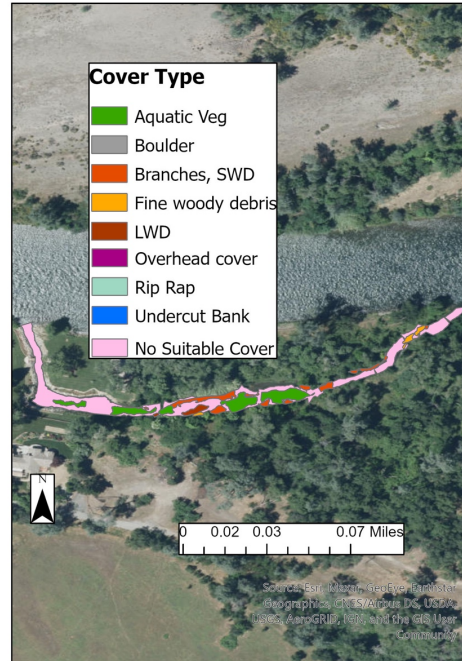
Post Restoration Habitat Mapping: Kapusta Keswick Release 3,250 CFS

Depth & Velocity Mapping



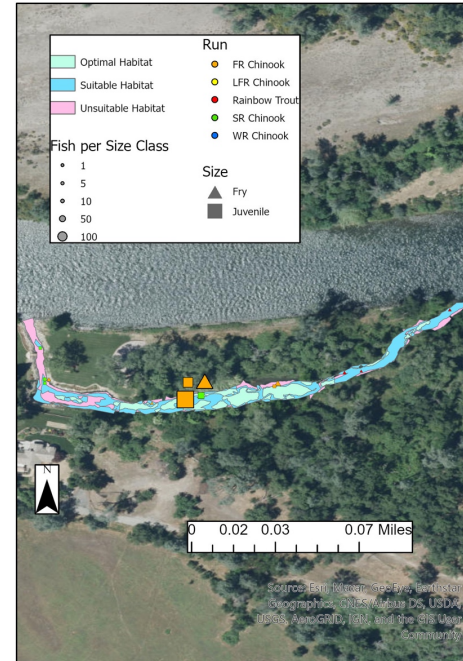
*Dates mapped: 2-11-21

Cover from Predators



*Dates mapped: 2-9-21, & 2-10-21

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 3-25-21

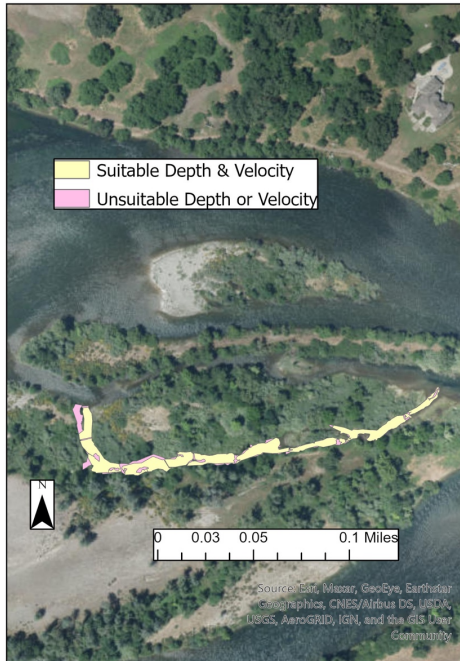
*Keswick flow during snorkel: 3500 cfs

Kapusta Island (Impact)

3,500 CFS

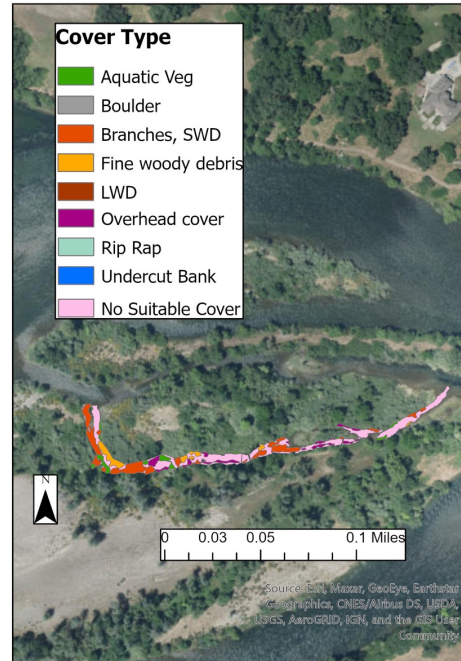
Pre Restoration Site Habitat Mapping: Kapusta Island Keswick Release 3,500 CFS

Depth & Velocity Mapping



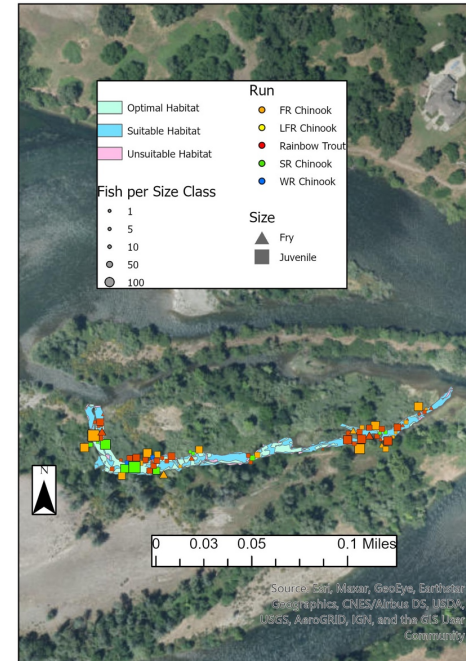
Dates mapped: 3-17-21 & 3-22-21

Cover from Predators



*Dates mapped: 3-17-21 & 3-22-21

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 4-8-21

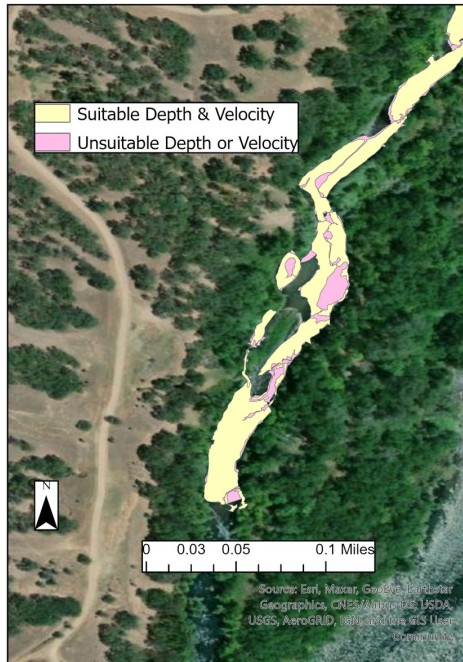
*Keswick flow during snorkel: 5000 cfs

Lake California (Impact)

Lower - 3,250 CFS

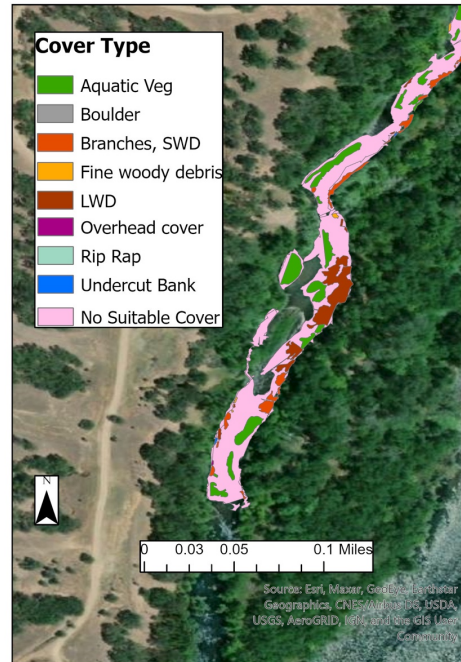
Post Restoration Habitat Mapping: Lake California (Lower) Keswick Release 3,250 CFS

Depth & Velocity Mapping



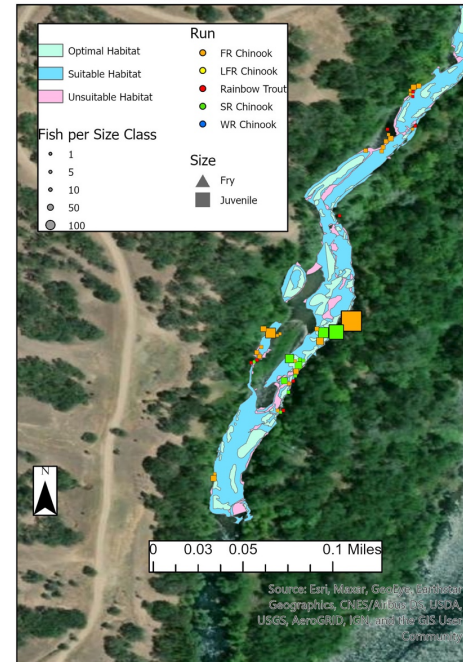
*Dates mapped: 1-5-21, 1-6-21, 1-7-21, 1-13-21, & 1-14-21

Cover from Predators



*Dates mapped: 1-7-21, & 1-13-21

Fish Locations Among Optimal & Suitable Habitat

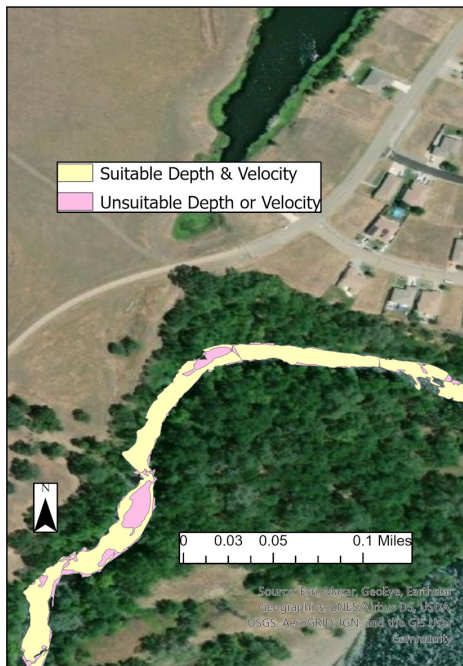


*Dates snorkeled: 4-21-21, 4-22-21, 4-27-21, 4-28-21
*Keswick flow during snorkel: 8000 cfs

Middle – 3,250 CFS

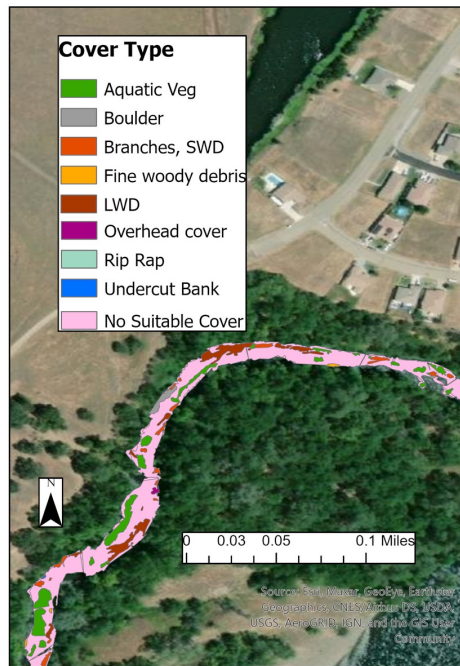
Post Restoration Habitat Mapping: Lake California (Middle) Keswick Release 3,250 CFS

Depth & Velocity Mapping



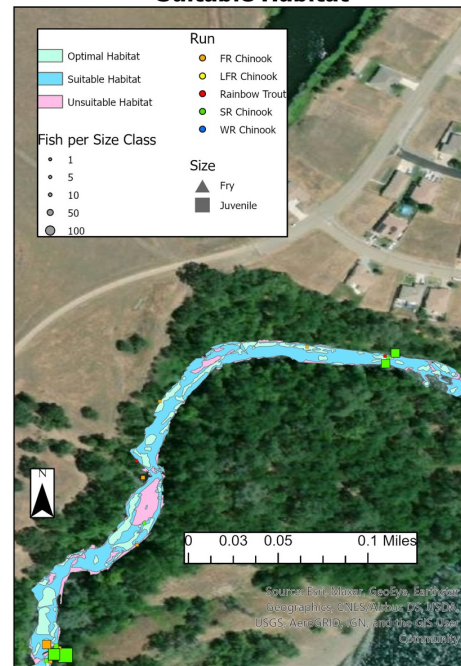
*Dates mapped: 1-5-21, 1-6-21, 1-7-21, 1-13-21, & 1-14-21

Cover from Predators



*Dates mapped: 1-7-21, & 1-13-21

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 4-21-21, 4-22-21, 4-27-21, 4-28-21
*Keswick flow during snorkel: 8000 cfs

Upper – 3,250 CFS

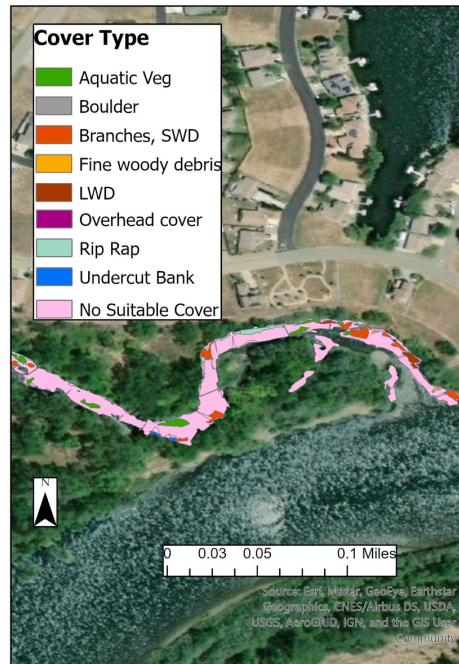
Post Restoration Habitat Mapping: Lake California (Upper) Keswick Release 3,250 CFS

Depth & Velocity Mapping



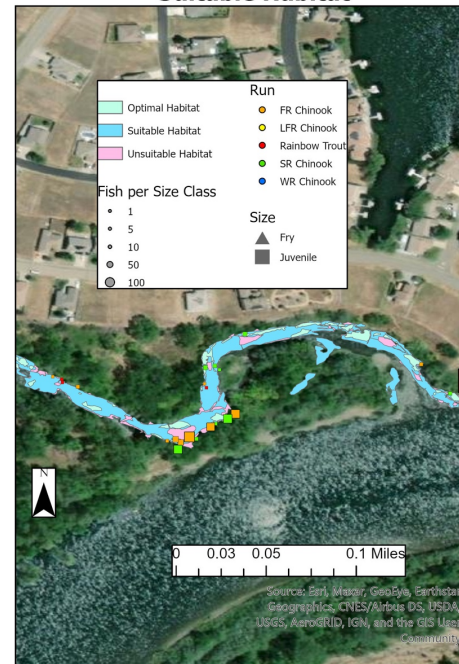
*Dates mapped: 1-5-21, 1-6-21, 1-7-21, 1-13-21, & 1-14-21

Cover from Predators



*Dates mapped: 1-7-21, & 1-13-21

Fish Locations Among Optimal & Suitable Habitat

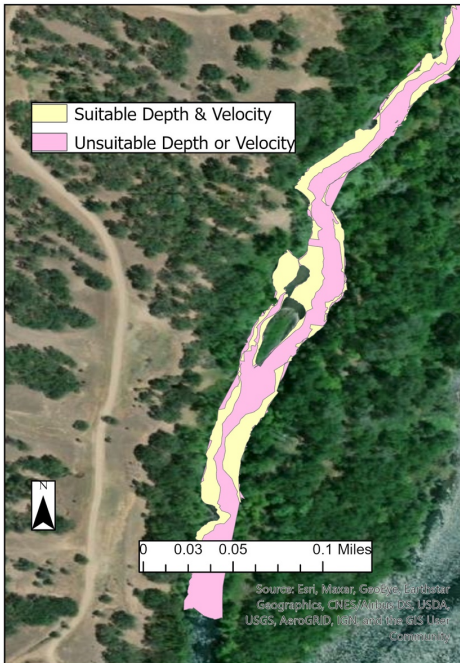


*Dates snorkeled: 4-21-21, 4-22-21, 4-27-21, 4-28-21
*Keswick flow during snorkel: 8000 cfs

Lower – 6,750 CFS

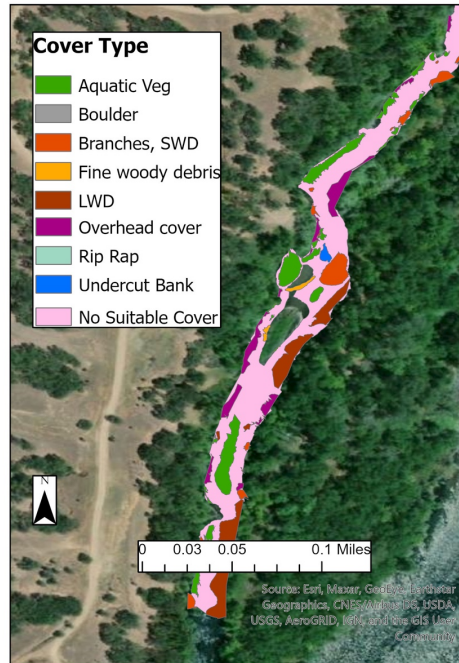
Post Restoration Habitat Mapping: Lake California (Lower) Keswick Release 6,700 CFS

Depth & Velocity Mapping



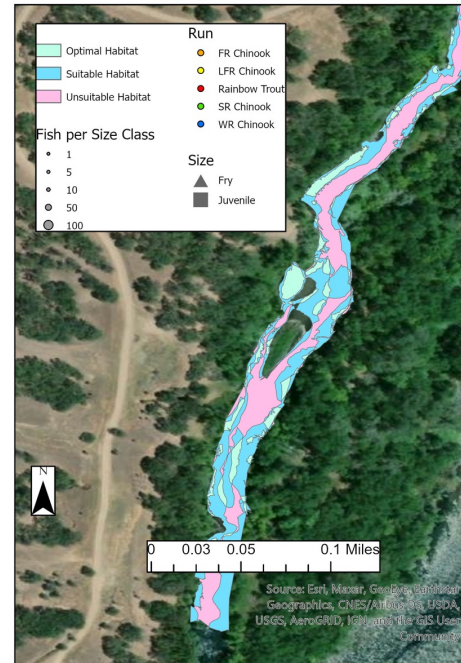
*Dates mapped: 9-21-20, 9-22-20, 9-23-20, 9-24-20, 9-28-20, & 10-13-20

Cover from Predators



*Dates mapped: 9-21-20, & 9-28-20

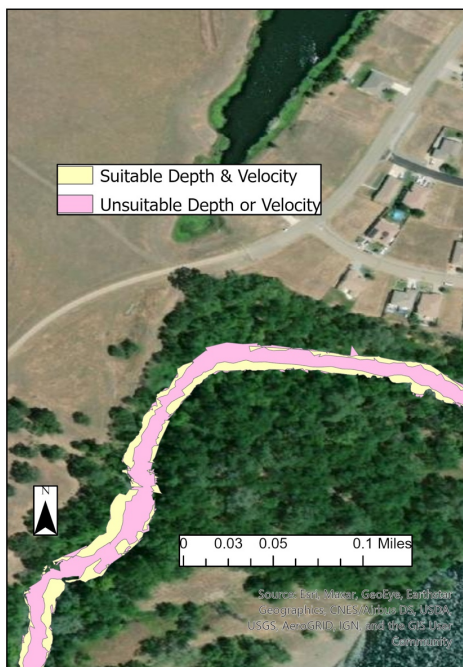
Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 11-18-20, & 11-24-20 (subsamped)
*Keswick flow during snorkel: 4400 cfs

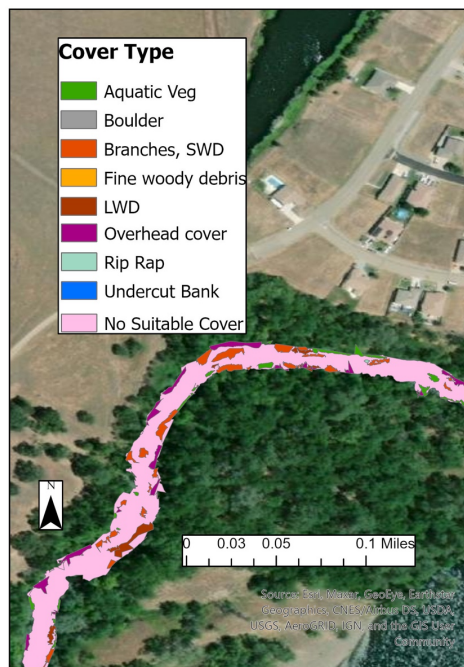
Post Restoration Habitat Mapping: Lake California (Middle) Keswick Release 6,700 CFS

Depth & Velocity Mapping



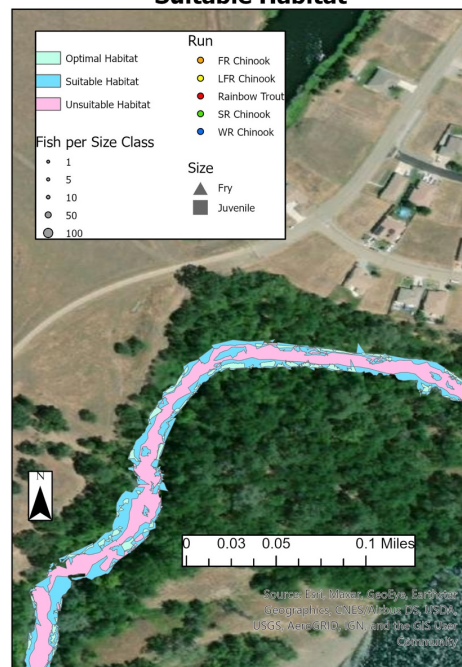
*Dates mapped: 9-21-20, 9-22-20, 9-23-20, 9-24-20, 9-28-20, & 10-13-20

Cover from Predators



*Dates mapped: 9-21-20, & 9-28-20

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 11-18-20, & 11-24-20 (subsamped)
*Keswick flow during snorkel: 4400 cfs

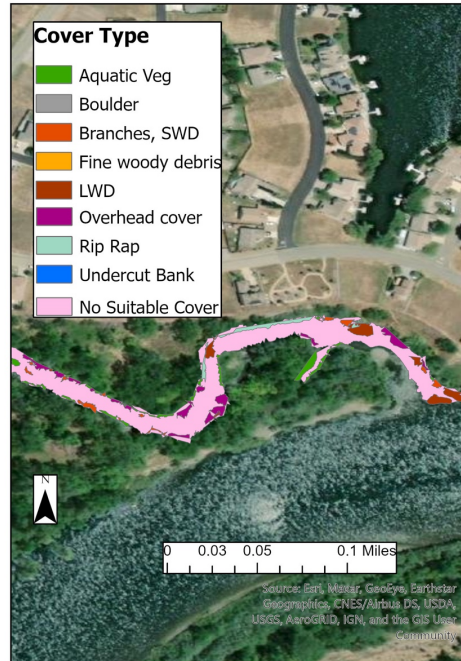
Post Restoration Habitat Mapping: Lake California (Upper) Keswick Release 6,700 CFS

Depth & Velocity Mapping



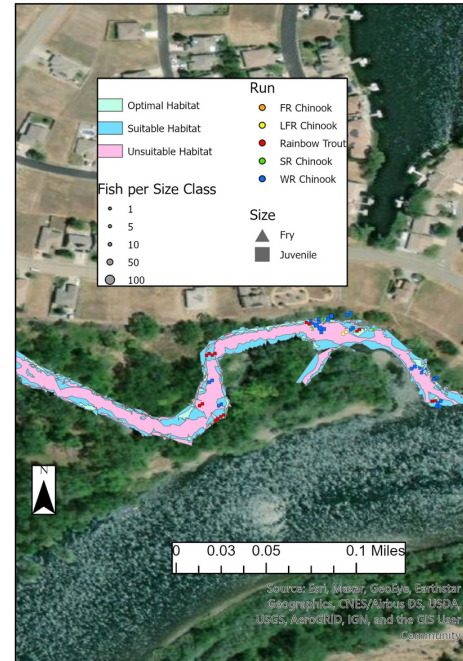
*Dates mapped: 9-21-20, 9-22-20, 9-23-20, 9-24-20, 9-28-20, & 10-13-20

Cover from Predators



*Dates mapped: 9-21-20, & 9-28-20

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 11-18-20, & 11-24-20 (subsamped)
*Keswick flow during snorkel: 4400 cfs

Painter's Riffle (Impact)

3,250 CFS

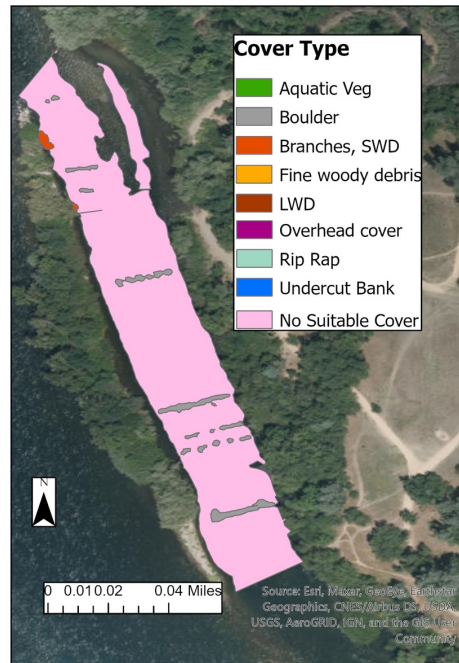
Post Restoration Habitat Mapping: Painters Keswick Release 3,250 CFS

Depth & Velocity Mapping



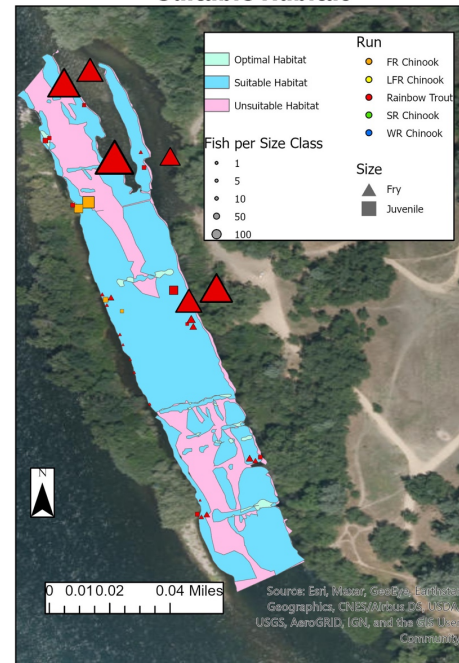
*Dates mapped: 2-23-21

Cover from Predators



*Dates mapped: 2-24-21, & 3-1-21

Fish Locations Among Optimal & Suitable Habitat



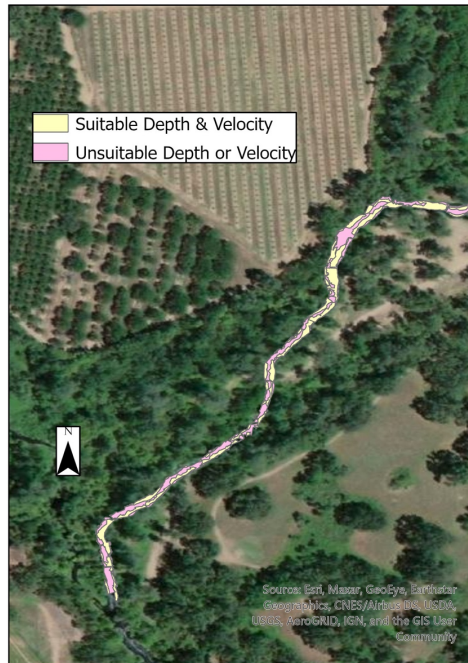
*Dates snorkeled: 4-7-21
*Keswick flow during snorkel: 4700 cfs

Reading Island (Impact)

Lower – 3,100 CFS

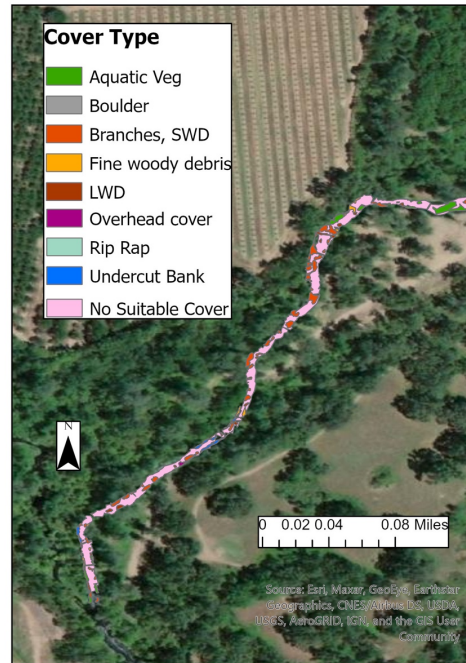
Post Restoration Habitat Mapping: Reading Island (Lower) Keswick Release 3,100 CFS

Depth & Velocity Mapping



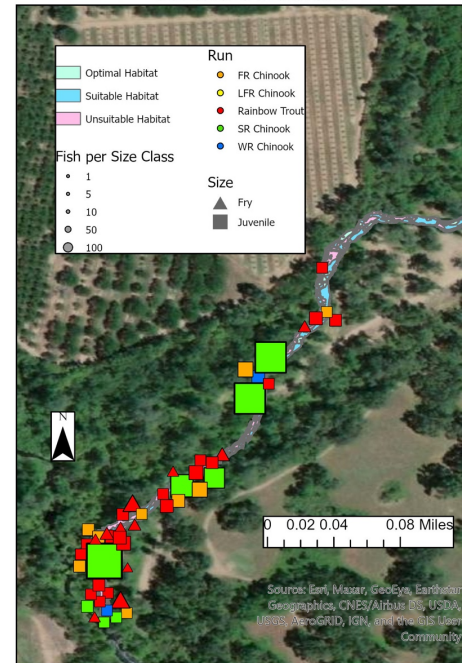
*Dates mapped: 1-19-21, 1-21-21, 1-25-21

Cover from Predators



*Dates mapped: 1-21-21, 1-26-21, & 1-27-21

Fish Locations Among Optimal & Suitable Habitat



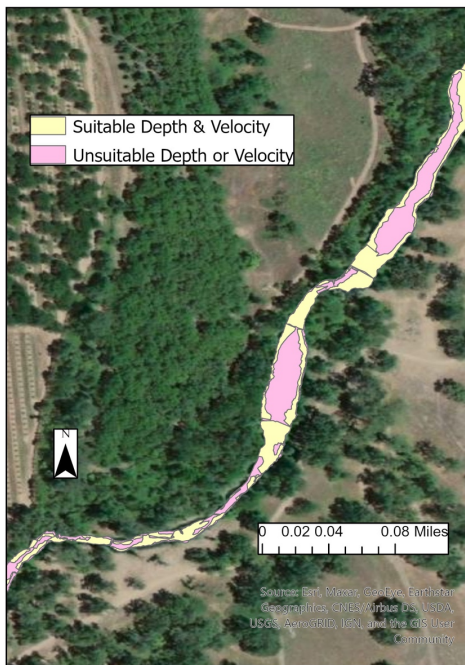
*Dates snorkeled: 4-5-21

*Keswick flow during snorkel: 4500 cfs

Middle – 3,100 CFS

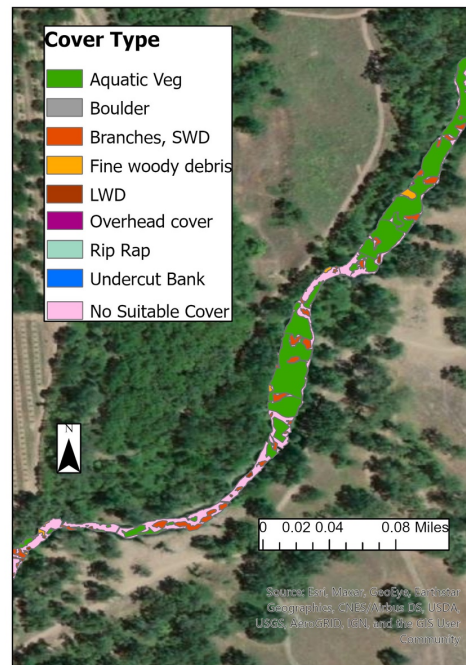
Post Restoration Habitat Mapping: Reading Island (Middle) Keswick Release 3,100 CFS

Depth & Velocity Mapping



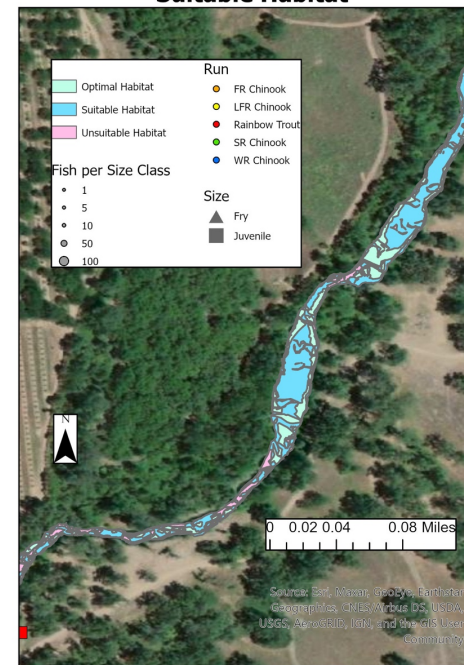
*Dates mapped: 1-19-21, 1-21-21, 1-25-21

Cover from Predators



*Dates mapped: 1-21-21, 1-26-21, & 1-27-21

Fish Locations Among Optimal & Suitable Habitat



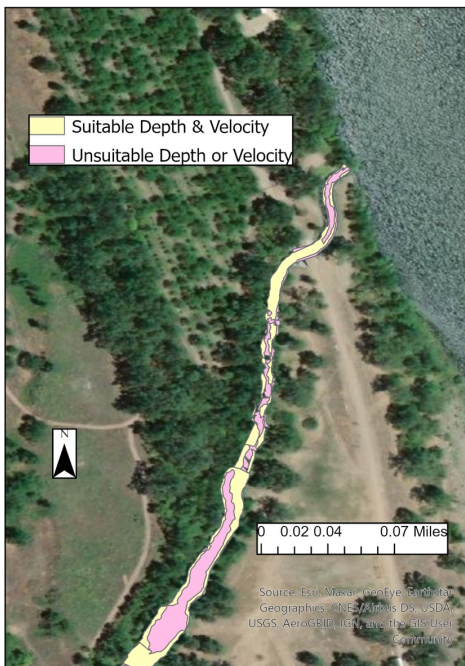
*Dates snorkeled: 4-5-21

*Keswick flow during snorkel: 4500 cfs

Upper – 3,100 CFS

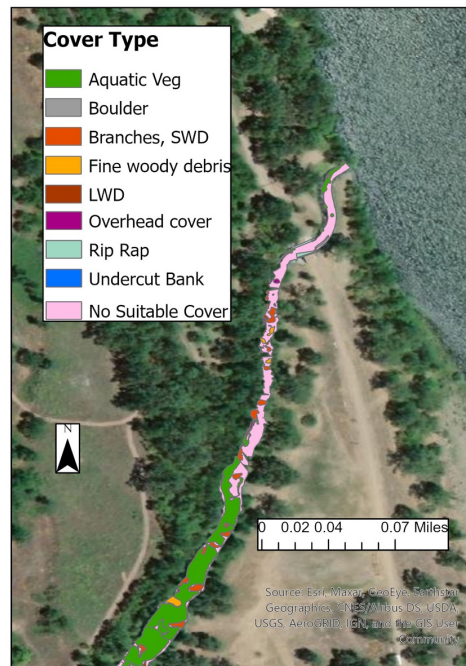
Post Restoration Habitat Mapping: Reading Island (Upper) Keswick Release 3,100 CFS

Depth & Velocity Mapping



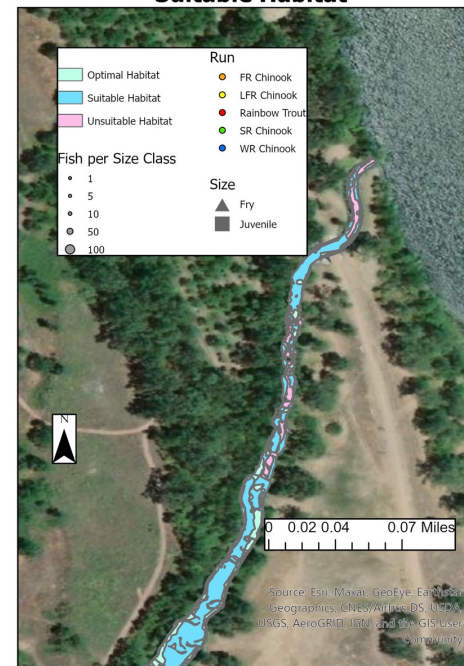
*Dates mapped: 1-19-21, 1-21-21, 1-25-21

Cover from Predators



*Dates mapped: 1-21-21, 1-26-21, & 1-27-21

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 4-5-21

*Keswick flow during snorkel: 4500 cfs

Rio Vista (Impact)

Lower – 3,250 CFS

Post Restoration Habitat Mapping: Rio Vista (Lower) Keswick Release 3,250 CFS

Depth & Velocity Mapping



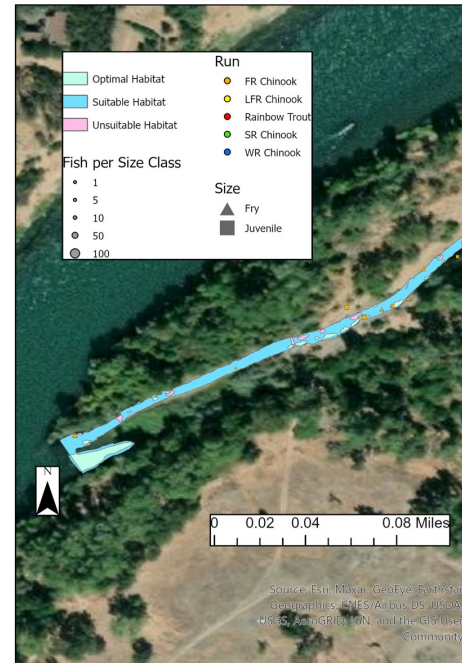
*Dates mapped: 12-31-20, & 1-4-21

Cover from Predators



*Dates mapped: 12-31-20, & 1-4-21

Fish Locations Among Optimal & Suitable Habitat



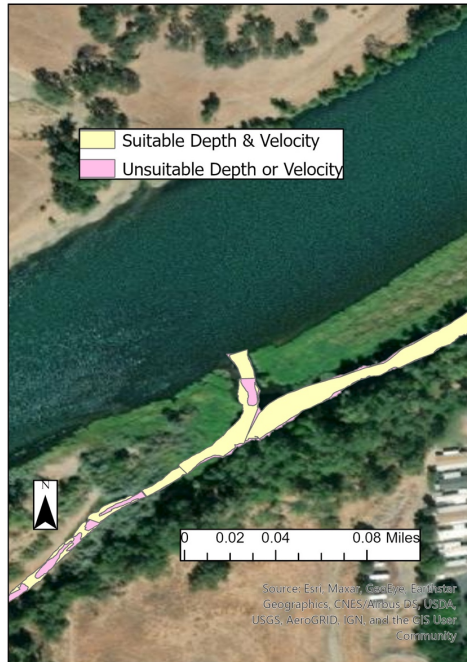
*Dates snorkeled: 3-23-21

*Keswick flow during snorkel: 3500 cfs

Middle – 3,250 CFS

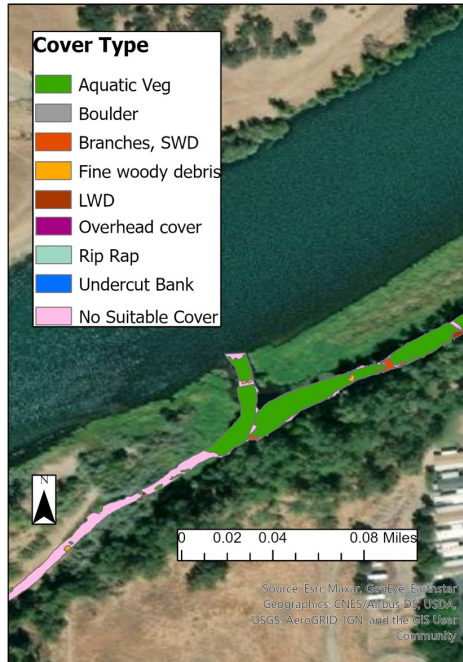
Pre Restoration Habitat Mapping: Rio Vista (Middle) Keswick Release 3,250 CFS

Depth & Velocity Mapping



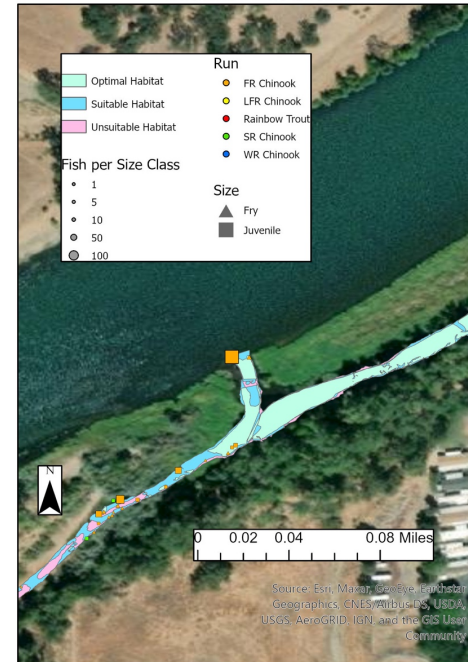
*Dates mapped: 12-31-20, & 1-4-21

Cover from Predators



*Dates mapped: 12-31-20, & 1-4-21

Fish Locations Among Optimal & Suitable Habitat



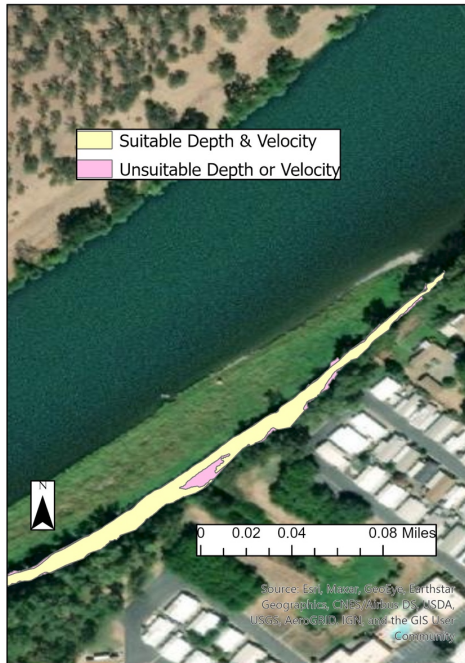
*Dates snorkeled: 3-23-21

*Keswick flow during snorkel: 3500 cfs

Upper – 3,250 CFS

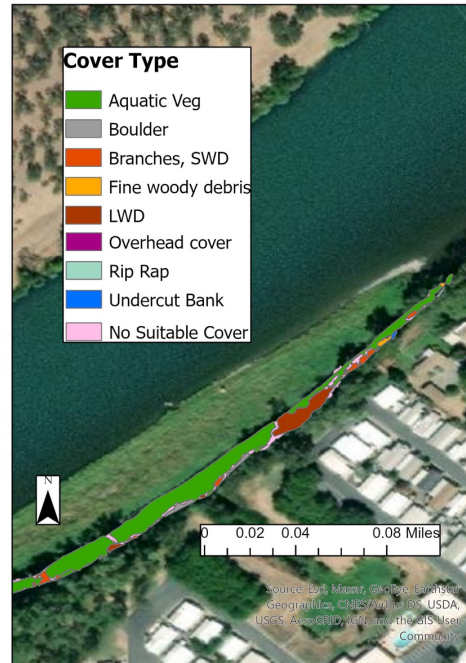
Pre Restoration Habitat Mapping: Rio Vista (Upper) Keswick Release 3,250 CFS

Depth & Velocity Mapping



*Dates mapped: 12-31-20, & 1-4-21

Cover from Predators



*Dates mapped: 12-31-20, & 1-4-21

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 3-23-21

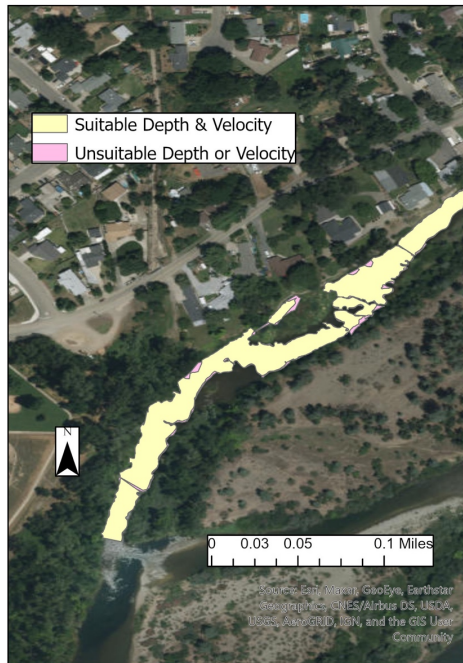
*Keswick flow during snorkel: 3500 cfs

Shea Island (Impact)

Lower – 3,250 CFS

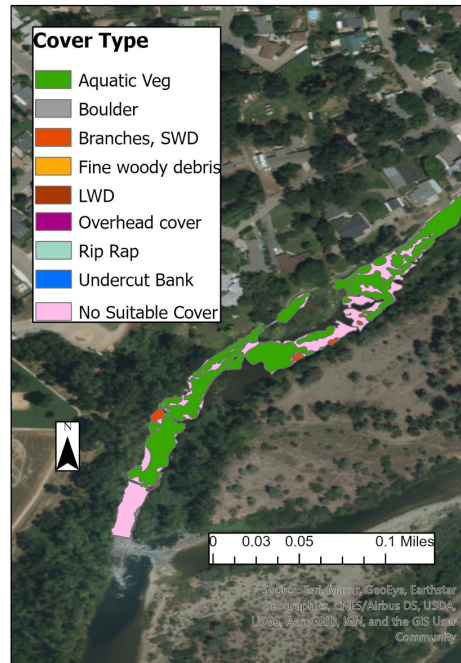
Pre Restoration Habitat Mapping: Shae Island (Lower) Keswick Release 3,250 CFS

Depth & Velocity Mapping



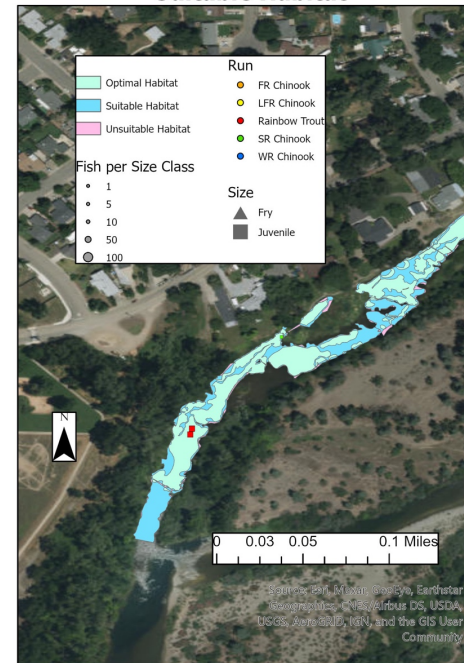
*Dates mapped: 2-16-21

Cover from Predators



*Dates mapped: 2-10-21 & 2-16-21

Fish Locations Among Optimal & Suitable Habitat



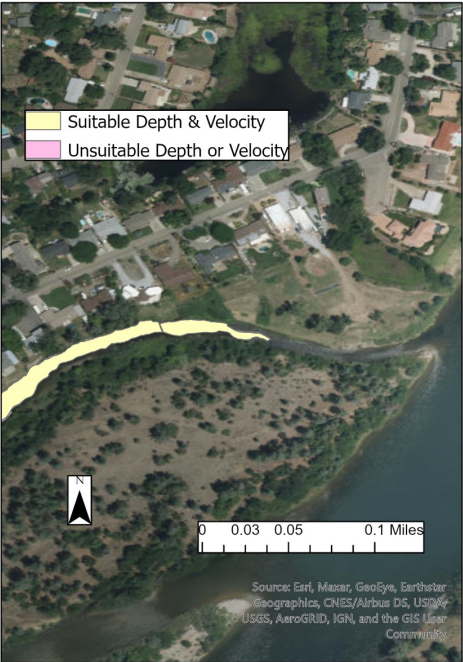
*Dates snorkeled: 4-5-21

*Keswick flow during snorkel: 4500 cfs

Upper – 3,250 CFS

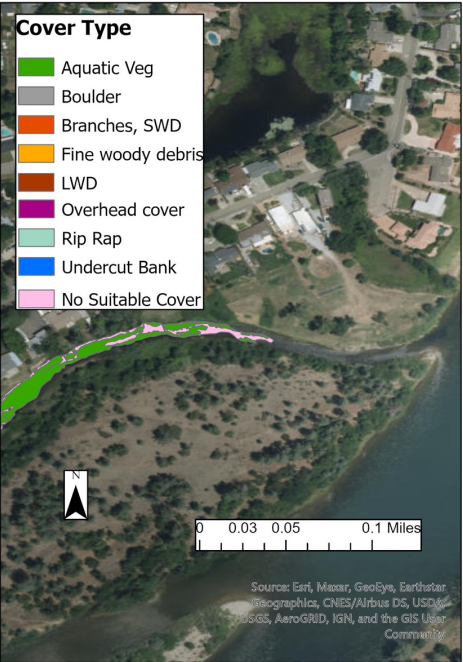
Pre Restoration Habitat Mapping: Shae Island (Upper) Keswick Release 3,250 CFS

Depth & Velocity Mapping



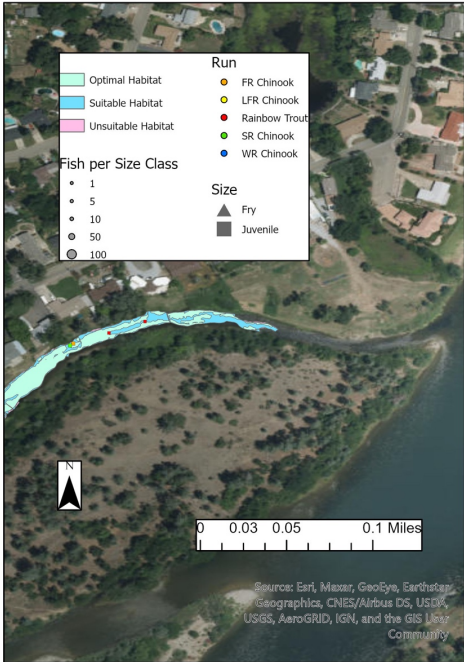
*Dates mapped: 2-16-21

Cover from Predators



*Dates mapped: 2-10-21 & 2-16-21

Fish Locations Among Optimal & Suitable Habitat



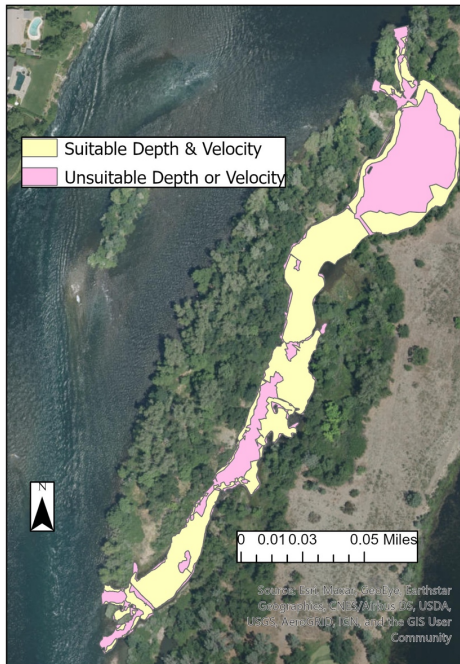
*Dates snorkeled: 4-5-21
*Keswick flow during snorkel: 4500 cfs

Wyndham (Impact)

3,400 CFS

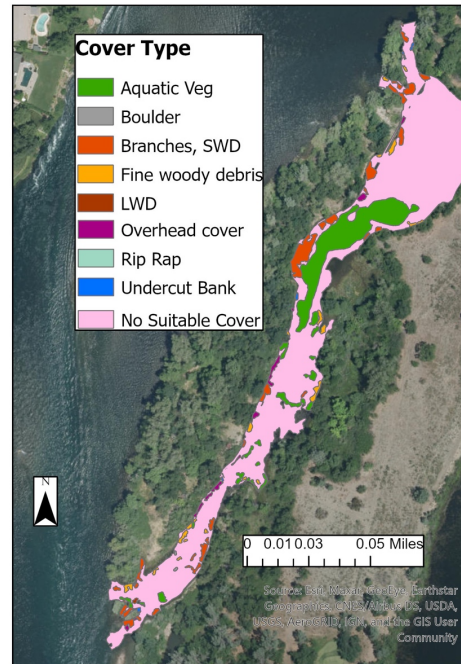
Control Site Habitat Mapping: Wyndham Keswick Release 3,400 CFS

Depth & Velocity Mapping



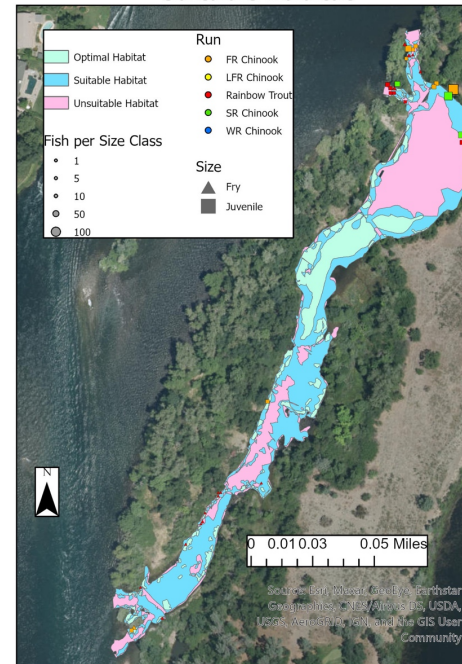
*Dates mapped: 3-3-21, & 3-4-21

Cover from Predators



*Dates mapped: 3-3-21, 3-4-21, & 3-9-21

Fish Locations Among Optimal & Suitable Habitat



*Dates snorkeled: 3-30-21, & 3-31-21
*Keswick flow during snorkel: 3500 cfs